Vol. IX TORONTO, JUNE, 1919 No. 6

The Canadian Medical Association Journal

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VOL. IX. TORONTO, JUNE, 1919 No. 6

THE DIFFERENTIATION OF EARLY TUBERCULOSIS AND HYPERTHYROIDISM BY MEANS OF THE ADRENALIN TEST

BY NORMAN CLIVE NICHOLSON

AND

EMIL GOETSCH

THE difficulties in the diagnosis of tuberculosis in its earliest stages are apparent to all workers in this field of medicine. Particularly is this true of that large group of patients in whom the familiar syndrome of fatigue, asthenia, loss of strength, loss of weight, nervousness in varying degrees, tachycardia, vasomotor instability and possibly slight elevation of temperature would make one suspicious of tuberculosis, but in whom the physical signs, laboratory and *x*-ray findings are insufficient for a positive diagnosis.

How frequently indeed one meets patients, who, under the suspicion of tuberculosis because of just such symptoms, have undergone a most rigid anti-tuberculosis therapy, extending in some instances over years. Not only have they followed the anti-tuberculosis therapy, they have indeed subjected themselves to every form of therapy calculated to benefit them, such as rest, extra-feeding, exercise, work, change of climate, possibly even surgical measures, but all to no avail,—their symptoms have remained unimproved.

An equally difficult problem is presented by another group of cases in which there is a tuberculous lesion definitely demon-

Read before the Montreal Medico-Chirurgical Society, March 28th, 1919.
(From the Trudeau Sanatorium, Trudeau, New York.)
Published in Canada by courtesy of *American Review of Tuberculosis*.

stratable by physical signs and *x*-ray, which, however, after a sufficient length of treatment may or may not show retrogression, and which is still accompanied by symptoms of rapid pulse, fatigue, and possibly slight temperature. Here it is questionable whether the symptoms can be attributed to the tuberculous lesion. Especially is this so, if after six months' rest cure the pulmonary condition shows improvement both from physical signs and *x*-ray findings.

Regarding both of these groups the question naturally arises: Are these symptoms referable to the tuberculous lesion; are they a residual syndrome of previously active tuberculosis, or are they due to an entirely different cause? It is our belief that in some of these cases the symptoms are due definitely to hyperthyroidism. Our problem then has been to discover the presence of hyperthyroidism. In the absence of a clear-cut history and physical examination warranting the diagnosis, a clinical test which would reveal the presence of hyperthyroidism would naturally be of the greatest importance. Such a clinical aid and test is available. We refer to the use of adrenalin to elicit a state of hypersensitiveness of the sympathetic nervous system such as is present in conditions of hyperthyroidism. We feel that the determination of a state of constitutional hypersensitiveness to adrenalin, injected subcutaneously, warrants the belief that a clinical state of hyperthyroidism exists. The use of this test by Goetch *New York State Journal of Medicine*, July, 1918) over a period of three years in conditions of hyperthyroidism, which were later confirmed by operation and microscopic study of the gland-tissue removed, has convinced us of the reliability of the adrenalin hypersensitiveness test.

To support our contention, which is, that hyperthyroidism is responsible for the general symptoms usually attributed to tuberculosis in most of the cases where the presence of clinical tuberculosis is questionable, and also where the tuberculous lesion is thought to be insufficiently active to account for the severity of the symptoms, we applied the adrenalin test, at first, to those patients in whom the diagnosis of tuberculosis was questionable, and later as a routine measure to all patients entering the Trudeau Sanatorium. By so doing it is clear that, hypothetically, we should be dealing with three classes of patients: first, those with frank tuberculosis, secondly those with hyperthyroidsim complicating the tuberculosis, and thirdly, those with definite hyperthryoidism only. There are patients who present the above-mentioned syndrome of symptoms common to all of these groups, namely fatigue, asthenia, loss of

weight and strength, increased or normal pulse rate, nervousness, and possibly slight elevation of temperature. It is this very similarity in the symptoms exhibited by these groups which has hitherto made the differential diagnosis so difficult.

Positive results in support of this view have been obtained in the comparatively brief time that we have been at work on the problem and we think these justify this preliminary report.

The technique of carrying out the test is as follows:

We want the patient to be as calm and restful as possible before the test so that the reaction to the adrenalin will stand out sharply in contrast. Accordingly the patient is put to bed the previous day and is reassured by the attending physician that the test will be in no way painful or associated with any danger. At this time, too, the standard case-history is supplemented by a history taken with special reference to symptoms of thyroid disturbances. One must determine the presence or absence of nervousness, throbbing, tachycardia, tremour, depressions, crying spells, struma, apprehensions, hot and cold flushes, cold hands and feet, fainting spells, memory lapses, and gastro-intestinal upsets. The regular routine physical examination is amplified by a detailed scrutiny of the signs suggestive of hyperthyroidism, such as positive eye-signs (Joffroy, Moebius, Von Graefe and Dalrymple), tremour, struma, thrills or bruits over the thyroid, throbbing of the carotids and of the abdominal aorta, dermatographism, the condition and distribution of the hair, and slight œdema of the eyelids, legs or hands. In this connection it should be borne in mind that hyperthyroidism may exist with negative eye-signs and only indefinite clinical findings in the thyroid gland. Consequently we feel that the response to adrenalin is a much more dependable criterion of hyperactivity of the gland.

On the day of the test the patient is placed as nearly as possible under normal conditions. By this we mean in a warm room without the appliances such as hot water bottles, heating devices, etc., which are common to the outdoor treatment of tuberculosis. The patient, of course, is to take his meals in bed. We emphasize these precautions because of the well-known hypersensitiveness and irritability of hyperthyroid and tuberculous patients. Because of the tendency of the thyroid to hyperactivity at the menstrual period the test is not given during this time.

We proceed with the test as follows: *"Two readings are

* Goetsch, E.—*New York State Journal of Medicine*, July, 1918, pp. 22-24.

taken, at five minute intervals, of the blood pressure, systolic and diastolic, pulse rate, and respiration. A note is made of the subjective and objective condition of the patient. This includes the state of the subjective nervous manifestations, the throbbing, heat and cold sensations, asthenia, and the objective signs, such as pallor or flushing of the hands and face, the size of the pupils, throbbing of the neck vessels and precordium, tremour, temperature of the hands and feet, perspiration, and any other characteristic signs or symptoms noticed. These signs are all noted previous to the injection of the adrenalin so that comparison may be made after the injection.

A hypodermic syringe armed with a fine needle which, when inserted, causes little discomfort, is then used to inject 0·5 c.c. (7·5 minims) of the commercial 1-1000 solution of adrenalin chloride (Parks, Davis & Co.) into the deltoid region, subcutaneously. Intramuscular and intravenous injections are not given. Readings are then made every two and one-half minutes for ten minutes, then every five minutes up to one hour, and then every ten minutes for half an hour or longer. At the end of one and a half hours the reaction has usually entirely passed off, sometimes earlier. The repeated early readings are made in order not to miss certain reactions on the part of the pulse and blood pressure that may come on in less than five minutes after the injection is made. This is particularly true of cases of active hyperthyroidism.

In a positive reaction there is usually an early rise in blood pressure and pulse of over ten points at least; there may be a rise of as much as fifty points or even more. In the course of thirty to thirty-five minutes there is a moderate fall then a second slight secondary rise, then a second fall to the normal in about one and one-half hours. Along with those one sees an exaggeration of the clinical picture of hyperthyroidism brought out, especially the nervous manifestations. The particular symptoms of which the patient has complained are usually increased, and in addition there are brought out many symptoms which have been latent. Thus it is not uncommon to have extra-systoles brought out, after the injections of the adrenalin. The patient is usually aware of them and may tell one that she has felt this same thing a year or two previously, at which time the symptoms of the disease were more active.

The following may all or in part be found: Increased tremour, apprehension, throbbing, asthenia, and in fact an increase of any of the symtoms which the patient may have complained. Vasomotor changes may be present; namely, an early pallor of the

face, lips, and fingers, due to vasoconstriction, to be followed in fifteen to thirty minutes by a stage of vasodilation with flushing and sweating. There may be a slight rise of temperature and a slight diuresis.

In order to interpret a test as positive we have regarded it as necessary to have a majority of these signs and symptoms definitely brought out or increased. Thus there is at times a considerable increase of pulse rate without much increase in systolic blood pressure, but with a considerable increase or exacerbation of the objective signs and symptoms; or there may be an increase of ten points in the pulse and blood pressure and a moderate increase of the symptoms and signs; or again, there may be only slight changes in pulse and blood pressure and considerable change in signs and symptoms. These may be regarded as positive. In a word, then, one must consider the entire clinical picture produced in order to gain a correct interpretation, just as in the disease itself one cannot expect every one of the characteristic signs and symptoms to be present in order to make a diagnosis.

In this report it is our desire to present briefly the results thus far obtained in our studies of forty cases. The diagnosis of these, as made by the Sanatorium staff, place them in the three following groups:

(1) In the first group there are eighteen in whom clinical tuberculosis was questionable, (2) in the second group there are sixteen with inactive clinical tuberculosis, and (3) in the third group there are six in whom clinical tuberculosis was definitely active. The terms "active" and "inactive" are based upon the latest conception of the Trudeau staff, as set forth in a recent article by Brown and Petroff.*

As is indicated in the table below, of the eighteen cases belonging to the "clinical tuberculosis questionable" group, there were ten who reacted positively to the adrenalin test, and eight who showed an entirely negative reaction. We wish to emphasize the fact that in practically all the cases of this group there was a clinical symdrome of symptoms which was suggestive of either incipient tuberculosis or possible hyperthyroidism. In the ten cases with a positive adrenalin hypersensitiveness the intensity of the reaction varied in a way remarkably parallel with the severity of the symptoms exhibited by the patient. Furthermore, the majority of these

* Brown, Lawrason and Petroff, S. A., "The Clinical Value of Complement Fixation in Pulmonary Tuberculosis Based on a Study of 540 cases." *The Americal Review of Tuberculosis*, 1918, II, 525-540.

cases showed only indefinite signs of hyperthyroidism by physical examination, and therefore had it not been for the additional diagnostic help afforded by the adrenalin test it would have been impossible, we feel, to state definitely whether or not hyperthyroidism was responsible for their symptoms.

In Group II, namely the "clinical tuberculosis inactive" group, some of whom presented the symptomatology common to both tuberculosis and hyperthyroidism, others a symptomatology not characteristic of either condition, we found that out of the sixteen cases, nine showed a positive response to the adrenalin test. The suggestive symptoms and physical findings, but particularly the positive adrenalin reaction, permit us to say definitely that these patients were suffering with hyperthyroidism, varying in degree from mildly to moderately positive. The hyperthyroidism in these cases was a complicating feature in their tuberculosis.

To our great satisfaction we found in Group III, consisting of six cases in whom there was a definitely but moderately active clinical tuberculosis, that the reaction to adrenalin was negative in all of them. We wish to point out, however, that in three cases there was a late slight typical reaction, namely a rise in blood pressure and pulse at the end of an hour or an hour and one-half, which is quite contrary to the typical hyperthyroidism reaction in which, at this time, the pulse and blood pressure are approximately the same as before the test. Furthermore, there was a conspicuous absence of the symptoms and signs so characteristic of the adrenalin response in hyperthyroidism.

In Table I we have listed the cases belonging to the three groups discussed above. The degree of the response to the adrenalin we have conveniently designated by the use of the "+" sign. A mild response is indicated by the use of "+", a moderate by "++", and a marked response is indicated by "+++". A negative reaction is indicated by the zero sign.

Analysis of Results

The importance of being able to diagnose a condition from which many patients suffer, namely a syndrome similar in many respects to that of early tuberculosis, in whom, however, clinical tuberculosis is not proved, is apparent to all workers in the field of tuberculosis. In fact there must be many patients presenting themselves at sanatoria for tuberculosis with symptoms which appear not to be accounted for by the amount of tuberculosis, either

TABLE I.

Clinical Tuberculosis Questionable		Clinical Tuberculosis Inactive		Clinical Tuberculosis Active	
Case No.	Adrenalin Reaction	Case No.	Adrenalin Reaction	Case No.	Adrenalin Reaction
5074	+++	4978	++	5056	0
5092	++	5079	++	5091	0
5092 B	+++	5079 A	+++	5071	0
5092 C	+++	4967	+++	5075	0
5024	0	5085	0	4126	0
5072	0	5073	0	4973	0
5088	0	5022	0		
5084	0	5022 B	0		
5077	0	5022 C	0		
5077 A	+++	4995	++		
4975	++	5105	++		
5008	+++	5107	+		
5009	+++	5109	++		
5110	++	5125	0		
5103	+++	5123	0		
5111	0	5090	++		
5124	0				
5031	0				

				Totals
Positive	10	9	0	19
Negative	8	8	6	21

active or inactive, which they have. Of this fairly large number of patients, we feel, as a result of our brief studies, that there is a considerable percentage suffering from hyperthyroidism. We have come to this conclusion as a consequence of the fact that there is in many of these patients a positive adrenalin hypersentitiveness. Furthermore, confirmatory support is afforded by a carefully taken history and physical examination.

We wish to make clear that in the first place the constitutional hypersensitiveness to adrenalin is an indicator of excessive thyroid function. According to the degree of the response we are permitted to draw conclusions as to the degree of thyroid overfunction. Consequently, there must of necessity be all degrees of thyroid overfunction from the mildest to the most marked. There are doubtless many individuals with a mild hyperthyroidism who respond mildly to the adrenalin test, and who have not been greatly annoyed by their symptoms. The fact that these patients react

mildly to adrenalin does not mean that in our opinion, they should receive medical and possibly surgical treatment for this hyperthyroidism. These individuals are living in comparative comfort as far as their hyperthyroidism is concerned, and are not incapacitated by it. Rest and well-regulated hygienic life is indicated for them whether they have or have not tuberculosis. If, however, the hyperthyroidism is incapacitating or even of such a degree as to be definitely annoying, then after the failure of a faithfully carried-out rest and hygienic regimen, it is time to think of surgical measures.

In those unfortunate individuals suffering from both tuberculosis and hyperthyroidism, the problem becomes more complex. It is of course apparent that the very nature of hyperthyroidism is such as to make it impossible for them to carry out the rigid rest regimen which their tuberculosis requires. The well-known nervousness and often extreme restlessness of these patients might readily defeat the ends to be gained by a well-regulated rest cure. On the other hand a surgical operation, unless definitely advisable, might be contra-indicated on account of the nature of the tuberculosis present. The question as to whether the tuberculosis or the hyperthyroidism is to receive predominant attention at the beginning of treatment rests with the physician in charge.

Another point we wish to bring out is that a mild hyperthyroidism may have existed in an individual years before the symptoms become so severe as to cause the patient to seek medical advice. When finally the patient does seek aid, he is found to have a rather clear history of hyperthyroidism; the physical findings may or may not be especially prominent, but there is a moderate or marked reaction to adrenalin. This would mean to us that his disease reached the stage where medical or surgical treatment is necessary. The situation here is analogous to that in tuberculosis where there may be an incipient stage of the disease not apparent to the patient, which later develops into a frank clinical tuberculosis. Our point is this: that it is just as wrong to say that a patient with a mild adrenalin hypersensitiveness has not a mild hyperthyroidism which may not require treatment at the time, as it would be to say that a patient had had his tuberculosis only during the time that it was clearly active.

It should be mentioned furthermore, that the adrenalin hypersensitiveness reaction affords us a means of early diagnosis of hyperthyroidism at a stage before the disease has seriously damaged the individual or perhaps incapacitated him. It thus allows us to appreciate an early mild hyperthyroid element in tuberculosis

should the two diseases exist concomitantly. The interesting question as to whether a mild hyperthyroidism may not have been the causative factor in his subsequent breakdown with tuberculosis, or whether the tuberculosis may in some instances elicit a mild hyperthyroidism, we shall not attempt to discuss in this preliminary report.

Summary

In probably every sanatorium for tuberculosis, and in fact in the practice of every physisican interested in this disease, there are patients who symptomatically might be considered as having either incipient tuberculosis or mild to moderate hyperthyroidism or both. The problem then is one of determining whether these symptoms are due to tuberculosis or hyperthyroidism or both. In many instances the severity of the clinical syndrome of symptoms appears to be out of all proportion to the amount or activity of the tuberculosis present. Heretofore it has been a matter of opinion and oftentimes a diversity of opinion among members of the same staff as to whether the amount and activity of tuberculosis present was to be considered responsible for the symptoms. Naturally, when the diagnosis depended upon such a difference of opinion difficulties arose, and in the end other patients have doubtless often suffered. We felt justified at the present time in offering a diagnostic help in these cases, namely a means of determining whether the disease from which the patients are suffering is purely a tuberculosis, a tuberculosis complicated by hyperthyroidism or a pure hyperthyroidism. The diagnostic aid consists in the determination of the constitutional hypersensitiveness to adrenalin. Hyperthyroidism, whether or not associated with tuberculosis, will give a positive reaction to adrenalin. Tuberculosis uncomplicated by hyperthyroidism, as it appears from our brief series of cases, does not react positively to adrenalin. We feel that in a considerable number of border line cases presenting symptoms more or less characteristic both of tuberculosis and hyperthyroidism, we can now pick out those suffering with hyperthyroidism. The value and importance of such a diagnostic aid to the patient need hardly be mentioned.

In conclusion, we would like to thank the medical staff of the Trudeau Sanatorium for their ever-ready help and interest.

TYPHOID SPINE*

By Sir William Osler, Bart., M.D., F.R.S.

Regius Professor of Medicine, Oxford, and Consulting Physician to No. 15 Canadian General Hospital

LET me begin at the end by reading a letter received January 3rd, National Hospital, Queen Square, London:

Dear Sir William—Sapper C., typhoid spine, was admitted yesterday. You will be interested to know that he is now walking normally. It was a good case, although he walked after ten minutes' treatment.

Yours sincerely,

L. R. Yealland.

Had Sapper C. gone to Lourdes—had he gone to our own Canadian Shrine, St. Anne de Beaupré, what a miracle! Paralyzed for nearly two years! unable to move body or legs; never out of his bed! and yet he walked in ten minutes! Well, it is a miracle all the same, an illustration of the faith that heals—not the same sort of faith, however, that the lame man at Lystra had, the firm persuasion that Paul and Barnabas were able to cure him, for I am afraid from what Dr. Yealland says, and from what we know, Sapper C. was not very anxious to get well.

Now to refresh your memory of the case, which is an important one from many standpoints. I saw the patient in April, 1916, with Dr. Whithall, at the V.A.D. Hospital, Maidenhead. The condition was as follows: Excessive nervousness and apprehension, so that he broke into a profuse sweat, trembled, and was very fearful lest we should attempt to move him. He was well-nourished, no mental disturbance, special senses normal, pupils widely dilated. When stripped a diffuse blush spread over the trunk, and there was an unusually persistent condition of goose skin. He was unable to move the body, any attempt being followed by agonizing pain in the back. The legs looked normal, and there was no wast-

* Clinical Remarks, January 7th, No. 15 Canadian General Hospital, Cleveden, Taplow.

ing, no disturbance of sensation. An attempt to sit up was followed by severe pain in the back; with great difficulty he was turned on the left side, but it was impossible to get him in the sitting posture. The spine was straight, no projection or unusual prominence. Below the mid-dorsal region it was very painful on pressure, and over the lumbar spines the slightest touch caused him to cry out. The examination of the abdomen was negative; nothing could be felt on either side or in the iliac regions on the deepest pressure. The spleen was not palpable. The legs could not be lifted from the bed or drawn up. On making the attempt they went into clonic spasm. The toes could be moved and the ankles flexed. The temperature of the legs was normal, and there were no trophic changes.

Sensation: Normal in hands and face. On the skin of abdomen, in a band about a hand's-breadth in width below the costal margin, there was extreme hyperæsthesia; the slightest touch caused him to cry out; he could not even bear the weight of the bedclothes. It extended to the back, but was not nearly so marked as in front. Below the navel the sensation was normal. On the skin of the legs he felt the pin-prick everywhere, and recognized the difference between heat and cold.

Reflexes: Knee-jerks exaggerated, slight rectus clonus, no ankle clonus; Babinski sign not present. Cremasteric and abdominal reflexes present. Bowels and bladder normal.

In February, 1916, the patient had an attack of typhoid fever, and was treated in the V.A.D. Hospital, Maidenhead. Though prolonged, it was not a severe attack, the temperature never rising above 104° F. The convalescence was slow, and he remained in the hospital all the summer. In October he had another febrile attack which was thought to be influenza. Following this, he began to have pains in the back and stiffness; these symptoms have persisted, and he has never been out of bed, and has become more and more incapacitated.

I asked to have the patient transferred here to the Duchess of Connaught's Hospital, Cleveden, where he was admitted May 7th, 1917. A spinal jacket gave great relief tc the pain in the back, and the hyperæsthetic girdle rapidly disappeared. In the eight months the changes have been an improvement in his general condition, manifested in a gain of weight, in less marked basal motor changes, and less apprehension and dread of pain. The area of hyperæsthesia has disappeared. The rigidity and immobility of the back has persisted. We have never been able to get him to sit up.

An attempt to move the legs at once brought on the clonic spasm, and there always was an appearance of unusual effort in attempting to make the movement. Night and morning one of the nurses made him draw the legs up and down, and this of late he has been able to do pretty well, and with less tremor. The reflexes have remained the same, and there has been no anæsthesia, though at times the tactile sensations seemed less acute than at others.

Shortly after admission to Taplow an *x*-ray picture was taken which showed a very dark shadow in front of the lower dorsal and lumbar vertebræ, practically identical with the shadows shown in Figs. 2 and 6 of Dr. J. B. Carnett's article in *The Annals of Surgery*, 1915. I submitted the picture to a number of experts, some of whom expressed doubts as to the significance of so large and dark a shadow. Major Morgan, when he took charge of the department, very kindly made a special study of the case, and the subsequent *x*-ray pictures showed a spine normal in every particular.

The case has attracted a great deal of interest, and in the weekly demonstrations I could not always carry conviction to the minds of visitors that the condition was purely functional, and that the patient would ultimately get well. My personal education in the disease is worth noting:—

The first case one sees of a special disease or complication usually fixes itself in the memory. In 1887, I was asked by Dr. Grassett, of Toronto, to see with him a young officer invalided from India with paralysis after typhoid fever. Healthy looking, excessively nervous, unable to walk or to move in bed, the striking feature was a painful stiff back, so that any attempt to turn or move made him scream. There was nothing to be made out on examination except tenderness in the dorsal region. The legs were weak, but there was no paralysis, and the bladder and bowels were unaffected. The pain and stiffness had lasted for more than five months, and he was brought home believed to be permanently disabled. He was so nervous that I regarded the whole condition as functional, ordered a jacket with massage to the legs, urged him to get up and go out and gave a favourable prognosis. The improvement was rapid and progressive, and he got quite well. This was my introduction to the condition which Gibney, of New York, first described in 1887 as typhoid spine. In 1890, at a meeting of the Association of American Physicians, Dr. Loomis called our attention to Gibney's observations. In Series I of our "Studies in Typhoid Fever", *John Hopkins Hospital Reports*, vol. iv, p. 73, I wrote a paper with the title, "On the Neurosis following Enteric Fever, known as

the Typhoid Spine" (the first communication on the subject to follow Gibney's), in which I reported two cases, and, in opposition to Dr. Gibney, took the view that it was a functional disturbance, analogous to "railway spine" or "hysterical spine". I was much impressed with the rapidity with which the cases recovered—far too rapidly in Case II for a spondylitis. In Series II of the "Typhoid Studies", *John Hopkins Hospital Reports*, vol. v, p. 315, I reported three additional cases, two very mild, all negative on examination, which improved rapidly with the Paquelin cautery. In Series III of the "Typhoid Studies," *John Hopkins Hospital Reports*, vol. viii, p. 485, I reported a mild case of "tender spine". To this time I had seen nothing to make me change my view of the functional character of the trouble. Meanwhile we had seen many cases of the bone lesions following the disease, and it always seemed a strong point in favour of my view that the typhoid spine never presented any swelling, and never went on to suppuration. In 1902 I had to change my mind. I saw a patient of Dr. Reinhardt, in the fourth week of convalescence, with stiff, painful back, weak legs, excessive nervousness, but in addition a well-marked painful swelling just above the right sacro-iliac articulation. Convalescence was slow, but no suppuration followed. Several other cases were seen, and with the help of Dr. T. McCrae I reached the belief that Gibney's original view was correct for some cases. Careful *x*-ray examinations showed spinal changes, and in a patient at the Clinique in July, 1904, Dr. Baetjer demonstrated a definite deposit of bone filling the space between the second and third lumbar vertebrae. In 1906 Dr. McCrae reported this case and another with bone changes in the spine,* and in the "System of Medicine" we edited together he gave an excellent analysis of the condition, and grouped the cases into three categories. First, those in which the hysterical features predominate. Secondly, cases with periostitis, or perispondylitis, with fever, pain, rigidity, and evidence of nerve root involvement. And thirdly, a group of cases with definite objective changes in the spine, as shown by the *x*-ray pictures, as well as by examination.

I confess freely to have taken too one-sided a view of the condition, but it was not without a strong basis of support. Such a prompt recovery, such as followed in several of the reported cases, seemed quite inconsistent with the existence of a spondylitis. In showing a case at the Johns Hopkins Medical Society, 1901, the

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* *Amer. Journ. Med. Science*, 1906, ii, p. 140.

following features were dwelt upon as indicating the functional character of the condition: First a state of neurasthenia with vasomotor changes, and in not a few cases the definite stigmata of hysteria. Secondly, stiffness of the back, persisting for weeks and months, is associated with pain, sometimes of an agonizing character, on movement. Thirdly, pain on pressure over certain spinal processes. Fourthly, a negative local examination, with the absence of fever. And lastly, in many cases, prompt recovery, with the use of the Paquelin cautery, and measures directed to the neurotic condition.

This case of Sapper C. is a strong confirmation of this view. You saw him last Monday after the spinal jacket was removed—still very neurotic, the spine absolutely rigid; we could not induce him to sit up; he could just lift his legs off the bed with the same type of general clonic tremor. I know that some of you felt hopeless about him, and he had got hopeless about himself, but new surroundings, a new mind, and very skilfully applied methods did in ten minutes what we have failed to do in a year—put him on his feet. I saw him on the 3rd looking well, walking well, and very happy to be on his legs again.

The literature of typhoid spine to 1905 is fully analyzed by Karl Fluss, *Centralblatt f.d. Grenzgebiete der Medizin und Chirurgie*, Bd. viii, and by Elkin and Halpenny in vol. i of the *British Journal of Surgery*, 1914. More than 100 cases have been reported, a large proportion in males. The onset is usually during convalescence, but has been weeks after, and has followed a sudden jar or twist or a blow. Constitutional disturbances are present in all cases. Fever is usually absent, but a range of 100° to 100·5° F. is not uncommon. Paroxysms of fever have been described, and there may be marked leucocytosis. A change in the mental condition has been noted in the majority of instances. The patients are excitable, apprehensive, self-centred, with the features of neurasthenia, and very often positive hysteria. In Sapper C.'s case this has been a striking phenomenon throughout. He was like a shell-shock subject, and at the first examination had an emotional storm with profuse sweating, goose skin, and then a vasomotor hyperæmia spread over the entire trunk. I have not seen a case without neurotic manifestations in some degree, even when signs of local disease were present.

Perhaps the most interesting case on record is the study by Dr. Leonard Ely, of New York, of his own attack (*Medical Record*, September 20th, 1902). One hesitates to suggest the existence of

hysteria in a professional brother, but one may say, at any rate, that the condition simulated it, and he confesses to have been "considered hysterical by his nurses". The professional baseball pitcher, whose protracted case is reported by Carnett; the cases of Lovett and Withington and Taylor's case had hysterical features combined with organic changes.

Of the local features, pain in the back, particularly on movement, is the most constant, and it may be of extraordinary severity, so that the patient screams on the slightest movement. It comes on in paroxysms, and is aggravated by the slightest jar or at any attempt to move. Patients have had to be chloroformed when they use the bed pan, and the threat of suicide has been recorded in several instances. The pain may be of a definite nerve-root character, extending round one or both sides, or it may pass down one or both legs.

Tenderness on pressure is present over the spinal processes of varying numbers, sometimes limited in the lower dorsal and lumbar regions. Rigidity of the back is a constant feature; the patients are unable to stoop, and have a difficulty in raising themselves to the sitting posture. One patient came into the hospital supported by two friends almost bowed double, and it was only with the greatest difficulty that the back was straightened.

If, as some orthopædic surgeons hold, a rigid back indicates organic disease, all of these patients had it, and no case I have seen has been more marked than in Sapper C. Clonic contraction of the muscles has been present in a number of instances. It may be nothing more than the fine tremor on attempting moving of the legs; but there is one type of muscular contraction in these cases that is of great importance, as to my mind it is an unerring stigma of hysteria. I refer to the rhythmic contraction of the abdominal muscles, noted by Ely in his own case, and present in two of Carnett's cases. In a patient admitted in October, 1902, with pain in the back and the ordinary features of typhoid spine, the abdominal muscles were contracting at the rate of 75 to the minute, which gave a very remarkable appearance to the flanks, which were moved in and out like a pulsation.

Inability to use the legs is present in severe cases, but there is no actual paralysis, no wasting, and the features are quite unlike post-typhoid paraplegia from myelitis or from neuritis. Reflexes are increased, but not changed in type. Disturbances of sensation in the form of hyperæsthesia are common, particularly in the back. Anæsthesia may be present, and it is interesting that Dr. Yealland,

in Sapper C.'s case, found a stocking anæsthesia, which certainly was not present on any occasion on which I or others examined him.

The last and important point is the evidence which exists in some cases for disease of the spine. This is of two forms: Kyphosis has been present, and of a type that could only occur from positive disease of the bone. Swelling of the soft parts on either side of the spine has been described and was present, as I have stated, in the patient seen by Dr. Reinhardt, the only one of the ten or twelve cases I have seen in which on physical examination changes were present. Of ordinary scoliosis and of associated atrophy of the lumbar muscles one cannot be so certain, as they are common enough in hysteria.

The *x*-ray picture has been studied now in a large number of cases. Osteoporosis, absorption of the intervertebral discs, and local bone proliferation have been described. It is extraordinary how few satisfactory skiagrams of the condition exist. I have looked in vain for one through the special journals, and some that have been published elsewhere are in the highest degree unsatisfactory. It is not fair to criticize a print without the plate, but Figs. 2 and 6, illustrating Dr. Carnett's paper, have had an extraordinary resemblance to the first plate taken of Sapper C., but subsequent study showed them to be artefacts, and the spine and adjacent bones show no trace of disease.

Upon one remarkable feature all writers dwell. Unlike ordinary typhoid periostitis the spondylitis rarely (if ever) goes on to suppuration. When present the lesion must differ essentially from that which we see in the long bones and the ribs. Typhoid bacilli have been frequently found in the bone marrow of the vertebræ, and there is no inherent reason why similar inflammatory changes should not be produced as in other bones. We know, indeed, from the presence of the kyphosis and from the *x*-ray picture that such changes do occur. Why they are not seen more often is, I believe, that they are not always present, and that we must recognize functional variety, which has its counterpart in certain forms of hysterical and railway spine.

A FUNCTIONAL CONCEPTION OF PATHOLOGY AS A BASIS FOR THE DIAGNOSIS AND TREATMENT OF HEART DISEASE

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A FEW years ago the pathology of the heart was taught in terms of the inflammatory changes in the different valves, and a heart was diagnosed as good or bad according to the number of murmurs that could be heard over it with a stethoscope. To-day we recognize that the functional capacity of the heart muscle is of far greater importance. The changes in the finer structure and physiological properties of the myocardium may not produce such obvious signs as valvular murmurs, but they do give rise to such signs and symptoms as may be detected by a careful examination and render possible a reasonably correct conclusion as to the ability of the heart to carry on its work.

Where we used to diagnose and treat cases of heart disease as mitral stenosis, or aortic regurgitation, we now think of them as various degrees of failure in the powers of the heart muscle. We are often able to go further and determine in which particular capacity or function of the heart muscle the signs of failure present themselves most conspicuously. As Peabody says, "the study of dead form has given way to the study of living processes." If a further illustration of this tendency be wanted, it may be found in the modern attitude towards diseases of the kidneys.

Whereas, a few years ago, the clinician tried to divide kidney disease into parenchymatous nephritis, interstitial nephritis and waxy kidney, he now endeavours rather to estimate the capacity of the kidneys to secrete the various constituents of urine, and thinks in terms of nitrogen retention, chloride retention, and water retention. He knows now that the classical signs of kidney disease, such as albuminuria, casts, change in the urea content, and specific gravity, do not by any means furnish an infallible guide to its functional capacity, or to the prognosis and treatment of the case.

Read before the Medical Society of Nova Scotia at the sixty-fifth annual meeting uly 3rd, 1918.

The functional conception of the pathology of the kidney is still in its infancy, the gaps in our knowledge are many, and the technique used in diagnosis is comparatively difficult, so that it is only beginning to be assimilated by the profession at large, and will better lend itself to discussion in an address like the present after the lapse of a few more years.

In the case of the heart, matters have reached a more advanced stage. It is now over thirty years since Gaskell published the first of his researches on which were based the myogenic theory of the heart beat.

It is sixteen years since Sir James Mackenzie, then a comparatively obscure provincial practitioner in Burnley, England, published his book on "The Pulse". This prepared the profession to receive and understand his epoch-making work on "Diseases of the Heart," which was published a few years later. Since that time few subjects in the whole of medicine have received the attention of a greater number of workers, and few advances in knowledge have been better received, or more fruitful in practical results.

In this address then, I propose to review with you some of the main facts in what we may still call the recent advances in the physiology and pathology of the heart, and to point out some applications of this knowledge to cases of heart disease.

The heart muscle is of two kinds, mature and primitive. The mature muscle forms the greater part of the walls of both auricles and ventricles. It is not sharply divided into separate fibres, but forms a branching network with nuclei at frequent intervals. Many strands of muscle are common to both auricles or both ventricles establishing anatomical and functional continuity between them, but there is no continuity from auricles to ventricles through this kind of tissue.

It is on the mature muscle that the heart depends for the tonic contraction which preserves the size and form of the chambers, and also for the force or strength of its beats through which the circulation is maintained.

The primitive cardiac muscle represents the less differentiated remains of the primitive cardiac tube of the embryo and approaches embryonic muscle tissue in the size and form of its fibres, although these show some variations in different parts of the heart. This primitive muscle is widely distributed, but is more especially prominent in three situations.

1. The sino-auricular node situated at the junction of the superior vena cava with the right auricle, is believed to be the

chief representative in the adult of the sinus venosus where the heart beat begins in the embryo and lower vertebrates. The sino-auricular node is the place of origin of the normal heart beat, has a rich blood and nerve supply, and scattered among the characteristic primitive muscle fibres, contains numerous ganglion cells. From it, strands of tissue pass out to all parts of the auricular wall carrying the stimuli which cause them to enter into contraction more or less simultaneously.

2. The auriculo-ventricular node at the base of the inter-auricular septem and near the mouth of the coronary sinus, is the adult representative of the auricular ring of the primitive heart. It is second only to the sino-auricular node in stimulus production and rhythmic activity and receives from it numerous fibres. This is a situation in which many extra systoles arise and it is an important distributing station for the contraction wave of the heart.

3. The auriculo-ventricular bundle originating in this node and passing down under the tricuspid valve to the inter-ventricular septum, is the only muscular connection between auricles and ventricles. It conducts the contraction wave down from the auricles and through its connections with a network of so-called Purkinje's fibres, carries it to all parts of both ventricles.

There are two rival theories as to the part played in cardiac function by nervous and muscular elements, respectively.

According to the "neurogenic theory" the cardiac rhythm depends for its origin and propagation on the nervous tissues of the heart. This has been widely advocated by experimental physiologists, but it has not contributed to practical advance in clinical medicine.

The "myogenic theory" attributes the essential activities of the heart to the muscular fibres and allows to the nervous elements only a trophic and regulative influence. In all probability the myogenic theory, as we now know it, is not the last word on the subject, but it has formed the foundation for most of the recent advances in the practical handling of heart cases and is probably the nearest approach to the truth that we have yet attained.

According to this view of the physiology of the heart, the muscular tissues, taken collectively, possess the following properties: Stimulus-production, excitability, conductivity, contractility and tonicity.

The extrinsic nerves and the intra-cardiac ganglia control, but do not initiate these functions. They may augment or inhibit

the activity of the heart muscle in the performance of its various functions, but that is all.

With this brief introduction we will proceed to consider the more practical questions of the diagnosis and treatment of heart failure.

The essential diagnosis of heart disease does not depend on the recognition of a murmur, but on the perception that the heart is unable to maintain an efficient circulation. The most important question to ask a prospective heart patient is how much effort it requires to cause shortness of breath or precordial distress. Where one or both of these symptoms are present during rest, one should think of absolute cardiac insufficiency; when they occur only on slight exertion, of relative insufficiency. The diagnosis is to be confirmed by excluding other possible causes for these symptoms, and by giving due weight to any signs of heart disease which may be observed.

Some writers advocate the estimation of the functional capacity of the heart by the effect of standard exercises on the pulse rate and on blood pressure, and the interval elapsing before these return to their original level. Where so many different elements have to be considered, however, any semblance of scientific accuracy predisposes one to shut his eyes to possible fallacies and may be a source of weakness rather than of strength. Personally I am quite satisfied with the results obtained by questioning my patients as to their ability to negotiate well-known hills without distress, and supplementing their statements by my own observations as the opportunity presents itself.

Where distress occurs from a smaller effort than seems proper to the age and sex of the individual, the physician must consider whether other causes are at work, such as anæmia or corpulence, lung or kidney disease, or poor condition due to lack of training. These considerations may be kept in mind and worked out as the examination proceeds. The routine examination of a case of suspected heart failure should include attention to the following points. While obtaining the personal history and the history of the present illness, questions should be asked as to past and present infections, especially rheumatism, chorea, tonsilitis, scarlet fever and syphilis; the patient should be cross-questioned as to the abuse of alcohol, tobacco, tea and coffee; enquiries should be made about physical or mental strain, either past or present; a description should be obtained of the origin and development of any symptoms of circulatory failure that may be present, such as shortness of breath,

precordial pain, frequent or violent action of the heart, cough, disorders of digestion, swelling of the legs or abdomen. Inspection should be made of the face for anæmia, flushed cheeks, cyanosis and exophthalmos; of the mouth for bad teeth, which so often lead to indigestion and distended stomach with pressure against the heart; of the neck for engorged and pulsating vessels, as observed in either the erect or recumbent posture; and also for the condition of the thyroid gland. In the arm, the arteries should be carefully palpated and rolled beneath the fingers for signs of thickening or calcareous change; the pulse should be examined as to rate, size, hardness and regularity; the blood pressure should be taken, preferably by the ausculatory method, so as to estimate both the systolic and diastolic pressure. If the pulse is large, or the pulse pressure greater than normal, the fingers should be examined for capillary pulsation. The chest should be examined by inspection, palpation and auscultation over the heart, aorta and lungs. The liver should be percussed and if possible palpated. The abdomen should be examined for ascites, gas distension, visceroptosis and enlarged spleen. The possibility of abdominal tumours should not be entirely forgotten. The legs should be examined for œdema, varicose veins and signs of poor circulation. The urine should be obtained and tested as fully as possible or according to the indications present.

Having completed such an examination we should be ready to form a reasonably accurate opinion of the functional capacity of the heart and to lay out an appropriate plan of treatment. In a few cases some further tests may suggest themselves, such as, investigation of the eye and finger movements in suspected hyperthyroidism, *x*-ray examination of the aorta for suspected aneurism, or the elucidation of an arrhythmia, by the graphic method or the electro-cardiogram.

In most cases of serious organic disease of the heart the mature cardiac muscle is involved in the disease, and there is failure in one or both of the two functions most characteristic of this kind of muscle, namely, contractility and tonicity.

When from disease, overwork, or inherent weakness, the heart becomes unable to cope with the work required of it, one of two things may happen:

1. The heart may make supreme efforts to empty its chambers, in spite of its disability, and give evidence of the strain it is under by pain or distress. The pain may be referred to the precordium, arms, or neck and is comparable to the colic of other hollow viscera

when contracting against great resistance. Along with the subjective symptoms of pain and distress one may sometimes note in the pulse an irregularity in the force of the different beats approaching more or less to a typical pulsus alternans. Where such a combination of symptoms presents itself, there is a strong probability that the heart muscle is suffering from a form of failure affecting especially the function of contractility. In such cases the circulation may not show much evidence of insufficiency during rest. There may be little or no venous stasis or œdema. The pulse may be moderate in rate and of good volume; and the heart may show little enlargement or may even seem small. On slight exertion, however, and sometimes even at rest, the heart gives evidence of the distress under which it is labouring, by sensations of oppression or pain in the chest, and perhaps by numbness and pain in the left arm. Failure of contractility is seen most typically in cases of angina pectoris, but we will return to this subject again.

2. In another group of cases the heart saves itself at the expense of the rest of the body. As the chambers cannot empty themselves easily they do so only partially, and their flaccid walls give way to make room for an increased amount of blood. Signs of dilatation appear. The muscular rings around the mitral and tricuspid orifices participate in the dilatation and allow an increasing amount of regurgitation. Regurgitation by a safety valve action relieves the pressure in the ventricles. If there has been precordial pain, it becomes less severe or disappears, but the veins become engorged, the liver enlarges, digestion is impaired, the circulation through the kidneys slows down and dropsy develops in the legs and abdomen. As the circulation becomes less efficient the heart begins to suffer with the other organs and a vicious circle is established, giving the condition a progressive character. Such is the picture of a typical case of failure of tonicity.

These two great types of heart failure may be characterized by calling failure of contractility the heart failure of symptoms, and failure of tonicity the heart failure of signs. That they are essentially distinct is proved by the fact that a man may be in the throes of angina pectoris, an alternating pulse may give evidence that the contractile power of the heart is impaired, he may even die of heart failure without any evidence of marked dilatation. On the other hand, we often find very considerable dilatation of the heart in individuals who give evidence of good contractile power by engaging in moderate physical work without undue distress.

Failure of contractility is seen in its most acute and typical

form in angina pectoris, which is defined by Sir Douglas Powell as "sudden paroxysmal disturbance of the heart's function accompanied by severe pain, disturbed breathing and a vague or instant apprehension of death". By excluding other likely causes, Sir James Mackenzie has satisfied himself that the most important element in the causation of an attack of angina pectoria is a failure of contractility. This in turn is most often due to starvation and degeneration of the heart muscle caused by narrowing of the coronary arteries or aortic disease. Angina pectoris is most common in the degenerative stage of life when sclerotic changes have had time to develop in the aorta and coronary arteries, but it is sometimes seen in younger patients suffering with organic disease of the heart, as a result of vaso-motor spasm, or from tea or tobacco poisoning.

Chronic failure of contractility is to be suspected when precordial pain or distress is felt on slight exertion, and is out of proportion to the other indications of heart disease. In these cases the pulse may be moderate in rate and of good volume, the heart may show little or no enlargement, there may be no valvular murmurs and no signs of congestion in the lungs, or systemic veins. In some cases we may detect an alternating pulse, which is always suggestive of failure of contractility. In other cases, we may have nothing to guide us except the distress caused by exertion, and perhaps some increase in arterial tension.

Before making a diagnosis we should consider other possible causes of precordial pain, such as pericarditis, aneurism, rheumatism, neuralgia, and hyperæsthesia of ovarian or nervous origin.

Chronic failure of contractility, like angina pectoris, is seen especially in cases of arteriosclerosis with starvation and degeneration of the heart muscle.

The treatment of failure of contractility is to be primarily directed, not to stimulating the heart muscle, as this is usually beyond our powers in these cases, but to relieving the heart of its work in every possible way. The means at our disposal for this purpose are many and we should employ them all so long as they do not conflict with one another. The first essential is rest, both physical and mental, to diminish the work of the body generally and the heart in particular. This is to be accomplished by rest in bed, if the symptoms are pronounced, and by exclusion of talkative and alarming friends. The patient must be separated as completely as possible from business worries and family troubles. Where rest is interfered with by pain or restlessness, these must

be relieved by morphine, chloral or bromide. In suitable doses, none of these drugs have as depressing an effect on the heart as lack of rest. In many cases some special position, such as leaning forward in bed, or even sitting up in a chair, may give the heart more freedom of action than recumbency. When pain is severe, and the heart is labouring against high arterial pressure, we may find in vaso-dilators like amyl-nitrite, a ready and helpful means of tiding over an emergency; but the long continued use of these drugs is to be deprecated, as their oft-repeated use is probably the opposite of beneficial to the heart and may cause undesirable changes in the blood.

It is important to relieve the heart from any undue pressure by surrounding organs. Pleural effusion should be removed at the earliest possible moment and within limits the same may be said of pericardial effusion. The bowels should be kept open and distension of the stomach prevented or relieved. This is to be accomplished in an emergency by giving a carminative, such as compound spirits of ether, aromatic spirits of ammonia and peppermint water equal parts, in doses of one or two teaspoonsful in water. No food should be given during an acute attack, and when the pain subsides, food should be chosen that will be of small volume and without gas forming properties. On the forbidden list should be especially all the new-fangled cereals, and even old-fashioned porridge, fresh bread, soups, and in some cases potatoes and other bulky vegetables. The safest foods are easily digestible solids, like boiled fish or chicken, baked custard and stale bread. Milk is well borne by some patients. Sugar is a good heart food and may be given as clarified honey or maple syrup.

As soon as possible the teeth should be put in perfect order and any deficiencies should be supplied by bridge work or plates. One of the greatest difficulties in these cases is that of supplying back lower teeth. Where expense is no object, it can usually be accomplished by a first-class dentist, and is well worth the trouble and expense. I do not know any measure more important in failing hearts than supplying good back teeth. The freedom from fermentation and gaseous distension, which usually follows, brings about a surprising improvement in the heart symptoms and may make all the difference, not only between comfort and discomfort, but even between life and death. The recent fad for pulling teeth as a cure-all is simply criminal.

As the symptoms subside, preparation must be made to regulate the life of the individual in the direction of avoiding all undue

effort. He must live on a low plane and may only be able to purchase a few months or years extension of life by giving up business and avoiding all excesses in food, worry and exercise, as well as in alcohol and tobacco. Where the patient can not, or will not, submit to these conditions, the outlook is poor and relapse may be expected.

In the acute stage of failure of contractility, digitalis is not likely to do good, and often does harm, but later on when the urgent symptoms have passed, it may be cautiously tried, and in a certain number of cases will be helpful. In many of these cases it probably does good by improving the circulation generally and especially that through the heart itself. We have the authority of many great writers of the past for recommending iodide of potash and arsenic in these conditions; but I have not used them enough to be able to recommend them from personal experience. Quite the contrary is the case with adrenalin. I have found it of the very greatest service in these cases, although most text-books say it is contra indicated in all cases accompanied by hypertension or arteriosclerosis. I believe that this drug is much maligned and grossly misrepresented. It has the reputation of raising the blood pressure whenever and however administered. The profession never laboured under a greater mistake. The raising of the blood pressure, which is so marked a result of a dose of adrenalin injected into a vein, is scarcely noticeable after hypodermic injection, and is usually quite absent when it it given by the mouth. I have given it to patients suffering with arteriosclerosis of the cardio-renal type and to the subjects of angina pectoris for months and years continuously, and in the majority of cases the blood pressure has become materially lower during its administration. This is probably to be explained by the fact that adrenalin increases the force of the heart beat and improves the circulation through the medullary centres; for it is a well-known fact that the better the circulation through the medulla, the less active is the vaso-motor centre. The ordinary solution of adrenalin chloride 1-1000, may be given hypodermically in doses of five or ten minims every two hours for a few days, and this may be followed up by fifteen or twenty minims by the mouth every two or three hours for weeks, or even years, as the case may require. Instead of adrenalin solution, suprarenal tablets may be given in doses of eight to ten daily.

As opportunity offers, one should do everything possible to improve the quality of the blood by hæmatinics like iron and arsenic, and by the addition of sugar to the diet in considerable

quantities. Before ordering sugar it is well to assure oneself that the patient has a good tolerance for it by testing the urine a few times, as it is not uncommon to find failure of contractility associated with diabetes.

Cardio-renal asthma is not a pure form of heart failure. It depends on a number of causes, some of which we do not fully understand. It presents many resemblances to cases of failure of contractility, and I think we are justified in holding that failure of contractility is at least a factor in most cases of cardio-renal asthma, or nocturnal dyspnœa. Like angina pectoris, it is seen in those suffering from arteriosclerosis and in the vast majority of cases the coronary arteries are involved. Pulsus alternans is sometimes present. Among the underlying causes of cardio-renal asthma is arteriosclerosis which puts increased strain on a weakened heart. Other factors are defective secretion of the kidneys with retention of acid sodium phosphate and other metabolic products, diminished alkalinity of the blood with reduced carrying power for carbonic acid, and limitation of the vital capacity or breathing power from effusion in the pleural cavities, congestion of the pulmonary vessels, or other causes.

The treatment of the attack is to be carried out in much the same way as for one of angina pectoris. A hypodermic injection of morphine is often the best medication. Relief usually comes with the morning, but the symptoms may return the next night. Between the attacks the treatment is essentially that of chronic nephritis, namely, limitation of animal food, warmth, and means to increase the activity of the skin and bowels. In addition, the heart is to be treated as nearly as possible as if the kidneys were normal. In other words, heart failure is to be treated by rest and heart tonics. It is now generally admitted that nephritis accompanied by hypertension is no contra indication for digitalis. On theoretical grounds it was once supposed that digitalis would still further raise the blood pressure and should be withheld. Practical experience shows the contrary to be the case. Where the heart needs digitalis, its administration is nearly always followed by a very distinct fall in blood pressure and very often by an improvement in the general condition of the patient. The members of the profession are mostly still at the stage of theory as regards the use of adrenalin preparations in cardio-renal cases and nearly every author that refers to the subject does so only to condemn the practice. If any one will only take the trouble to try adrenalin in a few cases I am sure he will be surprised at how often the blood

pressure will come down as the condition of the heart improves. There is some experimental evidence that increased suprarenal activity is one of nature's means of readjusting the metabolism in disease of the kidneys, and if so, adrenalin is indicated in renal inadequacy. I have given adrenalin freely in cases of hypertension where the systolic pressure was over 250 and in one case for as long as three years with great symptomatic improvement, and have found the blood pressure materially lowered far oftener than otherwise.

Failure of tonicity is more familiar under the name of dilatation of the heart. It is the most typical because the most generally recognized form of heart failure. Its presence is suggested by shortness of breath on exertion and especially by œdema of the legs.

The first stage in diagnosis is the recognition of cardiac enlargement by palpation, percussion, or *x*-rays; the second stage is the exclusion of pure hypertrophy and pericardial effusion by attention to the strength of the cardiac impulse, the character of the heart sounds, and the outline of the precordial dulness. Confirmatory evidence is furnished by diffuseness of the impulse, epigastric pulsation, accentuation of the pulmonary second, embryonic shortening and sharpening of the first sound, valvular murmurs, engorgement of the pulmonary and systemic circulation, and enlargement of the liver and spleen.

In treating failure of tonicity, the first consideration should be rest, which may be absolute or relative according to the extent of the condition. In moderately severe cases, three weeks' absolute rest in bed will be indicated and should be followed by a gradual return to activity. In more severe cases the patient may have to be kept in bed for months. Restful nights should be assured if necessary by the administration of sedatives. In acute cases with dilated right heart and engorged veins a venesection will sometimes save life, and is not practised as often as it should be. Drugs of the digitalis group are usually beneficial. When the patient is in imminent danger, strophanthin may be given intravenously or intramuscularly in does of one-fourth to one-half milligram and may be repeated in from three to twelve hours according to the indications. Strophanthone, which is marketed in ampoules ready for use, is an excellent preparation. It is well to go carefully with strophanthin till one has some experience with it. When a first dose does good, a second dose may do more good, or, if given too soon, may be followed by sudden death, as occurred once in the practice of the writer.

When the danger is less threatening, some form of digitalis may be given by the mouth. The ordinary tincture usually answers very well and may be given in doses of fifteen minims three times daily. Where this is ineffectual, doses considerable larger may be tried under careful oversight.

Some show better tolerance for some of the active principals, such as one finds in Nativelle's granules of digitalin. Good results have also been reported from the infusion made from the fresh leaves, the powder, and various proprietary preparations, such as digipuratum, digalen, and Petit Miahl's digitalin. The important matter is to choose the right case for the digitalis rather than the right digitalis for the case.

As a rule, digitalis should be given in good doses until the pulse slows down to sixty or seventy, or symptoms of intolerance show themselves. In the latter case it may be discontinued for a few days and then resumed in smaller doses. If it agrees well the dose may be gradually reduced but the administration of small daily doses may be kept up for months or years.

I do not know any cause of failure in the treatment of heart disease so common as the custom of discontinuing digitalis as soon as it begins to do good. The fact that it is cumulative in action is an indication for watching its effects and diminishing the dose as experience suggests, but not for stopping it altogether and allowing the symptoms of heart failure to return. The control of the heart by digitalis may be compared to the regulation of a watch by moving the little needle to and fro. In a somewhat similar way we move the dose of digitalis up and down, first coarsely and then with finer and finer adjustments, until we find the dose that makes the heart act with the greatest efficiency and economy. After a time we can prolong the intervals between examinations but should let the patients continue the drug indefinitely if there is any tendency to heart failure, as it will do much to increase their comfort and prolong their life.

The best dose for continued administration differs very much in different patients and each case must be worked out individually. Some will eventually require only one dose a day of ten minims of the tincture, while others will get along best on doses of fifteen or twenty minims three times a day, and will become seriously ill if it be discontinued for even a week or two. There is no danger in digitalis if the effects are watched. For years past I have had scores of patients taking their daily dose, month after month and year after year, and have never seen any serious results from it.

On the contrary, I have seen patients live in comfort and freedom from relapse, who without the continued use of digitalis, would have been frequently laid up in bed with circulatory failure, and in many cases would have passed into a state of advanced heart failure ending in death.

Patients with the absolutely irregular heart of auricular fibrillation usually do remarkably well on digitalis, but need to take it as long as they live. Those with failure of tonicity without arrhythmia are more uncertain in their response to digitalis, but often do well and may recover sufficiently to get along without it for a time.

Some indications for stopping digitalis are nausea, diarrhœa, dryness of the mouth, aphasia, drowsiness and partial heart block. So far as known to the writer no form of valvular disease is necessarily a contraindication to its use. On the other hand, valvular murmurs are not necessarily indications for treatment of any kind. Valvular murmurs are worthy of due consideration as they often suggest active infection or degeneration or overwork of the heart muscle. It is also important to differentiate the more serious valvular defects from those that put less strain on the heart muscle, as in the former case the prognosis is less favourable, and the need of prolonged rest more urgent. Chronic valvular defects are themselves beyond treatment as a rule, and are to be considered rather for the light they shed on the ætiological factors at work and because of the strain they are likely to throw on the all-important heart muscle.

Sometimes, unfortunately, drugs of the digitalis class are not well borne and have to be given up. These cases furnish the most difficult problems in connection with heart work. Where the intolerance is limited to the stomach, it may be possible to introduce digitalis by enema; where this also fails it is probable that the heart muscle is in a state of degeneration and the prognosis is bad. In a few of these cases suprarenal tablets in a dose of eight or ten two-grain tablets a day, may do good as in failure of contractility. The period of rest must be prolonged. Theobromine may be useful in cases where œdema is a prominent symptom, but in which the kidneys are fairly normal. Theobromine may be given in powders or konseals in doses of ten grains three times daily. Some cases of heart failure with dropsy do well on one daily dose of digitalis and two of theobromine, or vice versa. Hæmatinics, baths, and graduated exercises all have a place in selected cases.

Speaking broadly of the treatment of the two main types of heart failure, it may be said that in treating failure of contractility,

the all-important consideration is that of warding off a fatal issue by reducing the work of the heart to a minimum. The reserve power of the heart muscle is so diminished that it is not wise or safe to push it by direct stimulation until the critical stage has passed. In failure of tonicity, on the other hand, the heart has to some extent saved itself at the expense of its efficiency and although rest is very important, it is necessary to force the heart itself more or less from the very first. We are in fact often compelled to do so when death threatens from suppression of renal activity, or from the effects of congestion and œdema of other important organs.

To obtain the greatest possible success in the treatment of heart disease, it is not sufficient to treat the particular form of heart failure as outlined above but also to determine the underlying causes and to attack them by every means at our disposal. It has already been pointed out that while valvular lesions are not directly open to treatment themselves, they are well worth study for the light they throw upon the causes at work. Speaking somewhat broadly it may be said that a patient seldom if ever dies of valvular disease of the heart. He dies because the same infection that attacked the valves has also impaired the efficiency of the heart muscle so that it cannot do the extra work required.

As long as the heart muscle is perfectly healthy it can adjust itself to an enormous amount of extra work and can struggle along under almost any combination of valvular lesions. It is when the heart muscle is attacked by infection or weakened by the degeneration of old age that it becomes unable to meet the demands made upon it.

When the physical signs point to mitral stenosis or aortic regurgitation, we know that the work required of the heart muscle is considerably increased and that some day it will probably give out under the strain, especially as these lesions are seldom found without some accompanying infection of the heart muscle. In the presence of any valvular lesion we should ask ourselves to what extent the work of the heart is increased, and also to what extent the heart muscle is probably involved in the disease.

Where we have reason to suspect the presence of rheumatic infection, we should combat it by rest and salicylates and in obstinate cases by tonsillectomy or vaccine therapy. We should only give up the struggle when we have conquered the rheumatism or had to acknowledge defeat by the death of our patient. Similarly we should always be on the watch for syphilis and resort to the Wassermann test in doubtful cases. In the case of other infections,

the same principles should be followed. Careful diagnosis and specific treatment is necessary if we are to overcome the resulting heart disease or stop its progress. Where other causes are at work, such as obesity or nephritis, we must act in accordance with our general knowledge of disease.

One factor which often plays a part in the causation of heart failure forms an exception to the general rule, in that it is not always wise to attack it directly. I refer to hypertension. Arterial hypertension is often dependent upon conditions more or less obscure which render a high blood pressure essential to the continued life of the inidividual. In some cases where the heart is threatening to stop forever because it is labouring against a pressure which it cannot over come, we may give temporary relief by means of vasodilators, but as a general rule it is a mistake to treat hypertension in this direct way. If we improve the metabolism by regulating the food and exercise, or quiet the nerves by rest and bromides, or improve the general health in some other way, the blood pressure may fall; but to prescribe nitrites indiscriminately in high blood pressure is quite as stupid and dangerous as to give acetanilid tablets to everyone complaining of headache without knowing whether we are dealing with eye strain, uræmia or brain tumour.

The two great divisions of heart failure which we have so far considered, namely, failure of contractility and failure of tonicity, include most of the cases in which the tissue chiefly affected is the mature heart muscle.

In considering the pathological variations in other functions of the heart we will find ourselves dealing especially with affections of the primitive muscle which for the most part present themselves as various forms of arrhythima. It is not proposed to attempt an exhaustive dissertation on the varieties of arrhythmia as the technique of their exact diagnosis by the electrocardiogram or the venous pulse, cannot be properly discussed in a single address. It should be possible, however, to consider some of the underlying principles and to emphasize a few practical points that may be applied in every day practice.

The normal rhythm of the heart is dependent upon the rhythmic development of a contraction in the sino-auricular node. The wave of contraction spreads so rapidly over the two auricles that all parts of these chambers contract practically together. It passes down more slowly from auricles to ventricles so that there is an interval of a tenth or even a fifth of a second between the contractions of the upper and lower chambers. This delay in conduction

is explained by the fact that the rate of conduction through muscular tissue varies inversely as the width of the bridge through which it has to pass and the only bridge connecting auricles and ventricles is the slender auriculo-ventricular bundle.

It is convenient to consider the principal varieties of arrhythmia as affections respectively of stimulus production, conductivity and excitability. There are at least three clinical types of arrhythmia caused by abnormal stimulus production, effective stimuli being produced in situations other than their usual place of origin in the sino-auricular node. These three types are extra systole, auricular fibrillation, and auricular flutter.

All parts of the heart where there is primitive muscle tissue have at least potentially the property of developing contractions, but as a rule the development is too slow to take effect before a contraction wave descends from the node. An extra systole is a contraction which develops from a stimulus arising in some part of the auricles or ventricles and which matures soon enough to forestall the regular stimulus descending from the node. The resulting contraction is premature and also less effective than the regular normal contraction. It is recognized in the pulse as an intermission or as a weak premature beat followed by a long pause; in the heart, as a short, sharp first, or first and second sound, occurring after a shorter interval than normal. Extra systoles may come singly or in series. They are sometimes observed in people apparently healthy but are more common in the latter half of life. They are of little or no significance in themselves, but may well suggest a careful examination of the heart as they are sometimes an early sign of myocadritis. More frequently they can be traced to indigestion or some condition of nervous excitement.

Extra systoles comprise most of the cases usually described as intermittent pulse and a just estimate of their significance should banish for ever the grave expression with which doctors as well as nurses often announce that the pulse is intermittent. Under ordinary circumstances "an intermittent pulse" has just a little more significance than a wart on the neck. A man with a wart on his neck may have an internal cancer and a man with an extra systole may have myocarditis, but in each case the fact has to be proved by other indications. An exception may perhaps be made in cases of fever. Extra systoles if present usually disappear when the pulse rate rises in fever. Where they persist, or first appear with a high pulse rate they carry with them some suggestion of a degenerating or overburdened heart.

Auricular fibrillation is the most important variety of arrhythmia because it furnishes a more definite indication for treatment than does any other kind. It is recognized by the fact that the pulse is absolutely irregular and usually frequent in untreated cases. The heart sounds are irregular in rhythm and loudness. The more marked and extreme the irregularity the more likely is the case to be one of auricular fibrillation. By means of the electrocardiogram it has been shown in these cases that the auricles are contracting piecemeal and with very great frequency. There are hundreds of contraction stimuli arising in the auricles every minute which crowd one another over the auriculo-ventricular bundle taxing the conducting power of this slender bridge to the utmost and reaching the ventricles in numbers greater than it can respond to. The attempts made by the ventricle to do so result in the frequent irregular beat usually seen in cases of auricular fibrillation.

This form of irrregularity is seen in young subjects in the later stages of mitral stenosis but becomes more frequent as age advances. It is frequently seen as a late result of athletic overstrain and especially in connection with the myocardial degeneration of old age.

The condition is occasionally temporary but usually permanent when once well established. The undue frequency of the heart beats tends to exhaust the ventricles, especially as practically the whole work of the heart falls on these chambers. In untreated cases the tendency is to progressive heart failure. There are, however, few diseases in which intelligent management can do more to relieve disability and prolong life than in these cases of auricular fibrillation. It is here that rest and digitalis win their most brilliant victories. One reason why digitalis is so beneficial in these cases is that it has the property of reducing the conducting power of the auriculo-ventricular bundle so that the ventricles receive fewer stimuli and contract less frequently. By rest in bed and appropriate doses of digitalis, it is often possible in the course of a few weeks to reduce the rate of the ventricle from 150 or more down to 70 or 80 heart beats per minute and by the continued administration of small daily doses we can often keep the rate of the ventricles within reasonable limits for years. The irregularity persists to some extent and the functional capacity of the heart is necessarily reduced, but I have treated one case of auricular fibrillation for sixteen years before death ensued and during practically the whole of this time the patient earned a good living.

Auricular flutter is a condition bearing certain resemblances to

auricular fibrillation. In this disorder the auricles usually beat two hundred or more times a minute, but not piecemeal as in fibrillation. The response of the ventricles is very variable. The beat may be frequent or of moderate rate, and either regular or irregular. The condition is sometimes hard to recognize and is often overlooked. Flutter and fibrillation are easily confused and sometimes alternate with one another in the same patient. In the case of doubt it is best to have an electro-cardiogram taken as this is the only certain way of distinguishing these two conditions from one another. The treatment of flutter is to be carried out by rest and digitalis as in the case of fibrillation. Under treatment cases of flutter often pass through a stage of fibrillation and ultimately return to a normal rhythm.

Paroxysmal tachycardia is a general term for sudden attacks of frequent heart action which last for minutes, hours or days and then cease almost as suddenly as they begin. During the attack the pulse rate is very high and is often uncountable. It may be either regular or irregular. On analysis, cases of paroxysmal tachycardia may turn out to be due to extra systoles occurring in rapid succession, to auricular fibrillation or to auricular flutter. We are in the dark as to the essential cause of these attacks but in many cases emotional and reflex influences seem to play a part. In my own experience I have found them especially common in those suffering with visceroptosis. As paroxysmal tachycardia is a purely clinical term applied to a number of essentially different pathological conditions, it is not surprising that the response to treatment varies very much in different cases. Complete rest is usually advised and this is certainly a safe course to pursue, but in some cases reported the attack has been cut short by violent exercise and in others by mechanical stimulation of the pneumogastrics. The latter is effected by Valsalva's manœuvre of having the patient take a deep breath and exert strong expiratory pressure against a closed glottis or by direct pressure upon the nerve trunks in the neck.

In most cases benefit follows the use of digitalis or strophanthus. Of the two I think strophanthus is decidedly the more effective in these cases. Stropthanthin may be given intravenously or some preparation may be given by the mouth but always under careful supervision as with strophanthus the margin of safety between effective and dangerous dosing is not very great. Personally I have seen excellent results from tablets containing the equivalent of five minims of the tincture. Such tablets are listed by several

of the leading manufacturers. They may be given from two to four times daily. Sometimes benefit seems to follow the exhibition of nerve sedatives like chloral, bromide or morphine. An ice-bag applied to the precordium is often recommended. Between attacks the general health must be attended to with special reference to the nervous, digestive, and sexual organs, and if the heart shows any signs of disease this must receive appropriate treatment.

Changes in the conductivity of the heart constitute the various forms of heart block in which there is interference with the passage of the contraction wave from auricle to ventricle or over the walls of the individual chambers. Time compels us to limit ourselves to-day to a consideration of those cases in which the conductivity from auricle to ventricle is interfered with as a result of disease of the auriculo-ventricular bundle or its immediate neighbourhood.

Cases present themselves showing three different degrees of auriculo-ventricular block:

1. Lengthened conduction time.
2. Partial heart block.
3. Complete heart block.

Exact diagnosis of any of these conditions is best made with the assistance of a venous pulse tracing or an electro-cardiogram showing the time relations between the systoles of the auricles and ventricles. In the absence of these instrumental aids, however, it is often possible to make a pretty shrewd guess as to the condition present.

Lengthened conduction time is to be looked for in any case where there is reason to expect extensive degeneration of the heart muscle. It sometimes betrays itself by the fact that the auricular contraction becomes audible as a third sound, faint in character and heard shortly before the normal first sound. It may also be suspected in any case where the administration of digitalis leads to marked arrhythmia—partial or complete heart block. Where lengthened conduction time is suspected it is well worth while having the necessary tests made to see if the suspicion is justified. This is not only for the sake of the evidence it may give of the presence of degeneration of the heart muscle or pressure on the auriculo-ventricular bundle, but also on account of the bearing that the findings may have on the wisdom of administering digitalis. Along with its many benefits, digitalis is said to have the untoward effect of slowing or inhibiting conduction in the heart muscle where this function is already below normal. For this reason it is usually

unwise to give drugs of the digitalis class where the conductivity of the heart shown signs of impairment.

Partial heart block presents itself as true intermittence of the pulse and heart beat as distinguished from the pseudo-intermittence of extra systoles. In partial heart block a beat is missing from the pulse from time to time, and there is at the same time an absence of heart sounds showing that the ventricle fails to contract.

The degree of impairment varies greatly in partial heart block. An occasional beat may be missed or one in six or one in two. The irregularity in the pulse differs from that of extra systoles in that it may become more pronounced when the pulse becomes frequent, whereas under similar circumstances extra systoles tend to disappear. In some cases the interval between pulse beats in a true intermission is not exactly twice the interval between normal beats but a little shorter. The reason for this cannot be discussed here but the effect is to produce a rather puzzling form of irregularity which may be mistaken by the unwary for auricular fibrillation. In partial heart block, however, the heart sounds are more alike in loudness and pitch and there are usually periods in which the beats are regular. By these indications it is usually possible to distinguish it from fibrillation without recourse to graphic methods.

Complete heart block is characterized by a complete severance of relations between auricles and ventricles. The auricles may beat anywhere from sixty to three hundred times a minute and the ventricles from five to ten up to forty or fifty. The usual ventricular rate is between twenty-five and thirty-five. A ventricular rate below forty is strongly suggestive of complete heart block. Confirmation of the existence of heart block is afforded by the recognition of faint sounds in the heart between the ventricular beats. These faint sounds are to be ascribed to contractions of the auricles.

In most cases of complete heart block there is a history of brief attacks of unconsciousness which often bear quite a resemblance to mild epileptic fits being preceded by aura and accompanied by twitching of one or more groups of muscle. They occur most frequently when a partial heart block is changing to complete heart block and there may be as many as fifty or one hundred attacks in twenty-four hours. When complete heart block is fully established, they become less frequent or entirely cease. All forms of heart block are dependent upon functional impairment of the primitive muscle of the heart, especially that forming the

auriculo-ventricular bundle. The impairment of the muscle may be caused by some form of degeneration, by destruction of the bundle by ulceration, or by the pressure of a tumour. The cases most frequently cured are those caused by syphilis and every case should be carefully investigated for any indication of this disease. In fact even in the absence of any proof of syphilis being present, a course of antisyphilitic treatment should be tried as it affords practically the only hope of cure.

Where heart block cannot be cured it does not follow that speedy dissolution will take place, as cases even of complete heart block have been known to live for many years. Before expressing an opinion on prognosis, attention should be paid to any indications of failure affecting the other functions of the heart, notably the contractility and tonicity. Where there are not very definite indications of heart failure outside the affection of conduction a reasonable hope may be expressed that with great care the patient may live for at least a few years.

Changes in the excitability of the heart and disturbances affecting the function of stimulus production are in the present state of our knowledge not easy to separate from one another. As far as I know there is no accepted standard for allotting cases of arrhythmia to one or other of these categories. While we are waiting for further advances in knowledge it is convenient to consider under the head of changes in excitability certain groups of cases in which the heart seems more than usually affected by influences reaching it from other parts of the body.

Without much pretence of scientific accuracy we would include among these disturbances of excitability those cases which are characterized by an undue increase in the frequency or force of the heart beat from slight causes. In some of these cases the heart's action is perturbed for long periods of time; in others the disturbance occurs in the form of attacks of palpitation or tachycardia interrupting at more or less frequent intervals a normal heart rhythm.

Among the signs found are frequent pulse, diffuse apex beat, epigastric pulsation, throbbing of the vessels of the neck, and cardiac dilatation the result of fatigue.

The causes include physical and mechanical influences, like athletic overstrain, distended stomach, visceroptosis; chemical poisons from without, such as alcohol, tobacco, tea and coffee; metabolic poisons formed within the body to excess or not properly gotten rid of, as seen in disorders of some of the internal secretions;

constitutional conditions like anæmia, rapid growth, exhausting diseases. Sexual causes include various forms of excess and suppression, while emotional and mental causes are exemplified by loneliness, grief, worry and fear.

Success in treatment depends on the recognition of the causes at work, and these are often multiple. A patient with an excitable heart, for instance, may present visceroptosis which calls for a suitable belt, worry and insomnia calling for bromides, and perhaps a general spirit of restlessness expressing itself in multitudinous activities, charitable and otherwise, requiring general regulation of the life before relief can be obtained. Among drugs, belladonna and bromide, singly or in combination, are the most useful. Malt preparations often prevent flatulence and give the heart more room. The same end can often be attained by the replacement of missing teeth and the results are more permanent. Ovarian extract is often of benefit in cases occurring about the time of the menopause. In short, each case must be studied as a new problem, and treated according to the factors at work.

No matter what form of heart disease or disorder we have to treat, whether the standard authorities would classify it as organic or functional, we must remember that we have to deal with a living, active tissue, the heart muscle. The conception of pathology which gives the most prominent place to functional conditions, can be applied to treatment with the happiest results. Such a conception not only simplifies diagnosis but it leads to correct therapeutic measures more directly than does the old structural conception of pathology. This does not imply that one must adopt a narrow point of view. No knowledge that one possesses need be wasted. A good knowledge of diagnosis is of inestimable value in helping one to trace disorders of the heart to their respective causes and as far as may be, to eliminate the continued operation of these causes. Let us by all means find out all we can about the valves and pericardium. Let us estimate the size of the heart as accurately as possible. Let us study the changes brought about in other organs by the disordered circulation. Let us differentiate between the various infections as our knowledge of bacteriology will permit. Let us give due weight to any evidence of disordered internal secretions. Let us do all this and prepare ourselves to do it better as the years roll on, but let us never forget that the heart is first and last a muscle, and that the real problem of heart disease is to so increase the functional capacity of that muscle or reduce the work it has to do that a proper factor of safety may be re-established and harmony reign once more.

THE USE OF A VACCINE IN THE RECENT EPIDEMIC OF INFLUENZA

By Major F. T. Cadham, C.A.M.C.

Winnipeg

IT was in the first week of October, 1918, that cases of the pandemic influenza occurred in Winnipeg; that is, the first cases occurred that were recognized as typical of the disease. The epidemic progressed rapidly, reaching its peak in the second week in November, and from that date slowly, but gradually, subsided.

With the knowledge that the disease was to reach us, methods were considered of combating it. The information, which could be derived at the time, was meagre. Quarantine and isolation methods appeared uncertain in their effect, and the value of prophylactic methods was not established. It seemed, however, to be an outstanding feature that infections of the respiratory tract were coincident with the disease and accounted largely for the mortality.

With the knowledge of this, it was considered advisable to use a vaccine as prepared from micro-organisms infecting the respiratory tract of those suffering from the disease.

The vaccine was to be used as a prophylactic to raise the immunity of those inoculated against respiratory infection.

Bacteriology

Naso-pharyngeal swabs were taken from one hundred and twenty-eight cases at different stages of the disease. Direct smears were made and stained, and cultures were made on hæmoglobin-agar and the following were the predominant bacteria found:

Streptococcus, 106; pneumococcus, 18; bacillus influenzæ, 23; Freidlander's bacillus, 6; staphylococcus, 24.

Sputum. Smears made from the sputum of eighteen cases showed a gram positive diplostreptococcus in sixteen. Cultures from sputum, taken from six patients suffering from pneumonia, showed in five, a diplostreptococcus, and in one a streptococcus and pneumococcus. Free expectoration, in the cases of pneumonia that developed in the military, was uncommon.

Empyema. Examination of the pus from five cases of empyema showed in four, streptococcus, and in the fifth, a streptococcus and a pneumococcus.

Blood Cultures. Positive findings were obtained in four out of twenty-two blood cultures. These four showed a characteristic diplostreptococcus; two of these positive cases were in the acute stages, one was a case complicated by pneumonia, and in one the culture was positive ten days after the acute sysmptoms had subsided. This patient had developed a phlebitis in the leg. The blood was collected in a vacuum tube with a culture media of 1 per cent. glucose bouillon to which had been added 2 per cent. sterile sheep's serum.

Post Mortem. A streptococcus was found in the lungs and blood of one case and a pneumococcus and staphylococcus in the lungs of another.

Fæces. In the examination of the fæces of eight cases a diplostreptococcus similar to that found in the pharynx, was isolated in four.

Streptococcus. In August, previous to the outbreak, of recognized cases of influenza, there had occurred at the Tuxedo Military Hospital two cases of pneumonia, followed by empyema. I now believe, from a study of their history, these cases to have been originally influenza. At the time a pure culture of streptococcus was obtained fron the pus of both these cases. A small amount of vaccine was made from this culture and four of the members of my laboratory staff were inoculated. Examination in two of those inoculated showed increased opsonic index for this streptococcus. This increased opsonic index persisted for four months in one case in which the examinations were continued.

The predominant micro-organism thus found has been a streptococcus or diplostreptococcus. This is a gram positive streptococcus appearing in either short or long chains. It is pleomorphic. The same micro-organism will appear at different intervals of cultivation as either a streptococcus or diplostreptococcus. No capsule was demonstrated. It is hæmolytic on first cultivation, but loses this power on sub-cultivation. Cultivated for some days in serum glucose bouillon it assumes a lanceolate shape. It forms discreet colonies on hæmoglobin-agar and confluent colonies on agar to which the blood had been added at 80°C. Grown in serum glucose bouillon it forms a diffuse cloud. It coagulates litmus milk with acid formation in seventy-two hours

and ferments lactose. It does not ferment inulin. The agglutination re-action with types 1, 2, and 3, anti-pneumococci serums was negative.

Preparation of the Vaccine

For the use in members of the Canadian Expeditionary Force, vaccine was prepared as follows: The strain of streptococcus obtained from an empyema that occurred in August was added to two strains of streptococci obtained from the naso-pharynx of soldiers who arrived from the East suffering from the disease on October 1st, 1918. From time to time strains of streptococci were added; these were taken from the naso-pharynx and one strain from blood culture and one from the lungs post mortem. One strain from the pharynx gave cultural characteristics of the streptococcus viridans.

The streptococci were grown in 1 per cent. glucose bouillon to which 2 per cent. of laked sterile sheep's blood had been added.

Strains of pneumococci were obtained from the naso-pharynx and sputum of the cases at the time and grown in similar media. A strain corresponding to type number 3 was not obtained.

After eighteen hours incubation the cultures were centrifuged in deep tubes at a high rate of speed for half an hour. The supernatant fluid was poured off and the bacterial deposit of the tubes was diluted with normal saline and pooled. A dilution was made of the streptococci to give 1,800 million per c.c., and dilution of the pneumococci to give 900 million per c.c., as by hæmocytometer count.

The influenza bacillus, obtained from the naso-pharynx of the first cases to arrive, was used. It was grown in flasks of solid media. Hæmoglobin agar was made by adding 20 c.c. of sterile sheep's blood to one liter of agar at a temperature of 80°C. This did not made a sightly media, but the influenza bacillus grew freely on it. The flasks were incubated two days before using to test sterility. The culture was carried in Lœffler's blood serum tubes to which had been added 2 c.c. of serum glucose bouillon, the contents of one tube sufficed to seed a flask. Cultivation was carried out for twenty-four hours at 37.5°C. The growth was washed off with normal saline and filtered through a sterile gauze. It was centrifuged and the bacterial deposit pooled and diluted with a normal saline solution to give a count of 1,200 million per c.c. This was judged by the turbidity of a standard suspension.

The saline suspensions of the streptococci, pneumococci, and influenza bacillus were mixed in equal parts and 2 per cent. trikresol added. After bottling in rubber-capped, sterile bottles, the vaccine was sterilized for a half hour at 60°C. Sterility was tested by inoculation of media and guinea pigs.

The dose was ½ c.c., containing approximately 300 million streptococci, 200 million influenza bacilli and 150 million pneumococci. Preliminary inoculations were carried out on the staff of the laboratory to determine size and interval of doses.

Inoculations

With the permission of Major-General J. T. Fotheringham, C.M.G., Director-General of Medical Services, the soldiers of the district were inoculated under the direction of Col. Webster, D.S.O., Assistant-Director Medical Services, Military District No. 10. The inoculation was voluntary.

The first inoculations were given on October 20th, 1918, and a second inoculation seven days later. There were some 7,600 soldiers in the district at the time and 4,842 were inoculated. In anticipation of an outbreak there had been established by the A.D.M.S. a special military hospital for the purpose of receiving such influenza cases as might develop. This hospital was under the charge of Captain D. A. Macdonald.

From October 1st, 1918, to February 28th, 1919, five hundred and twenty soldiers were admitted to this hospital suffering from the disease.

Clinical Diagnosis

The onset was, as a rule, sudden. The soldiers complained of general depression. In all the cases there was an initial chill or chilly sensations. Pains in the back and legs were common and more severe on the second day. Headache was a direct initial symptom, especially so in the later stages of the epidemic. Sore throat was a common complaint. The throat was dry and congested. A dusky appearance of the face and congestion of the conjunctiva were common. Some cases exhibited a coryza. A loose cough developed with the disease. Nose bleed occurred in about one-third of the cases. In all cases the temperature rose rapidly to at least 101°. Pulse rate was from 90 to 120.

Statistics of the Hospital

Of the five hundred and twenty cases admitted, two hundred and eighty-two had been inoculated with the vaccine and two hundred and thirty-eight were uninoculated. There was a total of fifty-eight cases of pneumonia and twenty-two deaths. Among two hundred and eighty-two inoculated seventeen developed pneumonia and five died. Of the five that died, three had received their first inoculation on the day they were admitted to the hospital. One developed the disease three days subsequent to the first inoculation and one ten days subsequent. The latter soldier was suffering from tubercular glands of the neck.

No soldier died who had been admitted subsequent to his second inoculation.

Among the two hundred and thirty-eight admitted who had not been inoculated with the vaccine there occurred forty cases of pneumonia and seventeen deaths.

Table I.—Report of Military Hospital for Influenza

	Admissions	Pneumonia	Per cent.	Deaths	Per cent.
Inoculated....	282	17	6·05	5*	1·7
Uninoculated..	238	41	17·1	17	7·1

* Of these five, three received their first inoculation on day of admission.

Captain D. A. Macdonald states that the disease and complications were not so severe in the inoculated. The average stay in the hospital of a patient was twice as long for the uninoculated as for the inoculated.

The cases came from the troops in the district except for forty cases which were taken from troop trains passing through Winnipeg. The troops were quartered in barracks throughout the city, in military hospitals and some at their homes. Cases developed in all quarters.

The inoculations were carried out two weeks previous to the peak of the epidemic in the city. The incidence of admissions into the hospital followed closely the curve of the epidemic in the city.

Conditions of exposure were practically the same in all the barracks and were no different for the inoculated and the uninoculated, except in the forty cases who developed the disease on

troop trains. Both the inoculated and uninoculated were admitted to the hospital at all stages of the epidemic.

A quarantine was placed on the barracks following the placing of a ban on public gatherings in the city. As the business of the district required to be carried on, absolute quarantine was not considered. Cases developed in all barracks and the military hospitals irrespective of the quarantine. The quarantine was lifted a week before Christmas and the men allowed leave. They scattered through all the infected districts of the city and province, with no increase in the incidence of influenza among them.

Inoculations in the Civilian Population

Under the direction of Dr. Gordon Bell, chairman of the Manitoba Provincial Board of Health, there was prepared in the same laboratory 600,000 doses of vaccine for the use of civilian practitioners. This was supplemented by 100,000 doses prepared by Dr. Boyd, pathologist of the Winnipeg General Hospital. The vaccine was distributed to physicians of Winnipeg and throughout the West.

Approximately one quarter of this vaccine was prepared as before stated, the balance contained strains of bacteria as obtained from Dr. E. C. Rosenow, of Rochester. The dose of this vaccine was ½ c.c., containing approximately 300 million pneumococci, 200 million influenza bacilli and 150 million streptococci. A second dose was advised.

Reports were received from one hundred and eight physicians at various points in Manitoba and Saskatchewan. These reports are summarized in Tables II and III.

Table II.—Incidence on Disease and Mortality in the Inoculated

	Once	Twice	Total
Number of persons inoculated	28,815	24,184	52,999

Incidence of	After first Inoculation	Per cent.	After second Inoculation	Per cent.	Total	Per cent.
Influenza	2,843	9·8	2,360	9·7	5,203	9·8
Pneumonia	177	·61	123	·50	300	·56
Deaths	61	·21	24	·09	85	·16

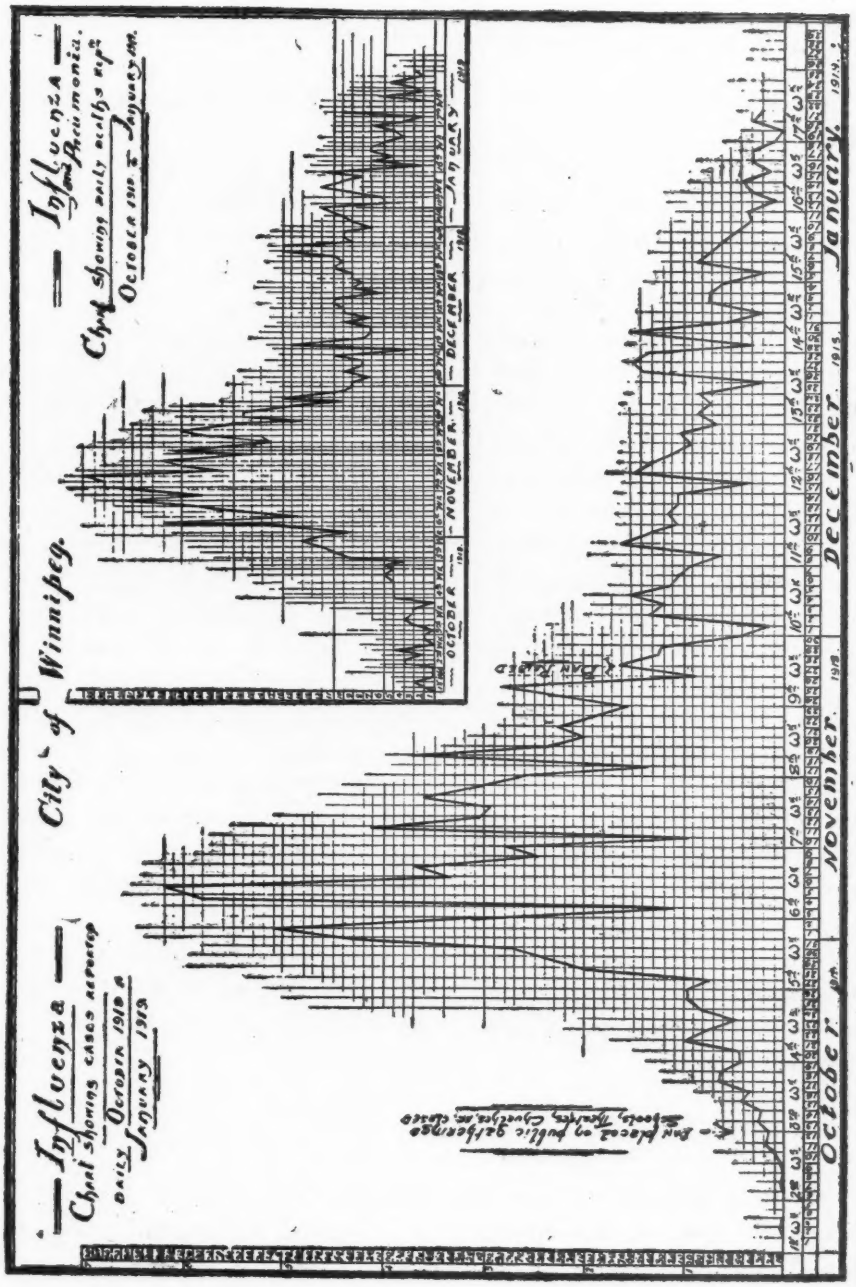
Influenza
City of Winnipeg.
Chart showing cases reported
Daily October 1918 to January 1919
Influenza
Pneumonia.
Chart showing daily deaths from
October 1918 to January 1919.
October
November
December
January

TABLE III.—INCIDENCE OF DISEASE AND MORTALITY IN THE UNINOCULATED

Number of uninoculated in clientele of physicians reporting 85,941.

		Per cent.
Influenza	21,285	24·8
Pneumonia	1,869	2·2
Deaths	563	·66

To the question "Do attacks of influenza appear to be modified if contracted following one or more injections of the vaccine?" One hundred and one physicians of one hundred and eight reporting replied in the affirmative.

There was no definite report of the vaccine being valuable in the treatment of influenza or pneumonia.

In reply to the question "Since influenza and pneumonia have been fatal in such large percentage of pregnant women has vaccine apparently afforded protection?" Thirty-two out of thirty-seven physicians answering this question answered in the affirmative.

The majority of these inoculations were given in the earlier stages of the epidemic, but no attempt was made to keep accurate statistics on this point. The ages of those inoculated were not obtained. Due to the exigency of war the profession was depleted and all branches were forced to work under a great strain; also the people were nervous, so that it was difficult to obtain full statistics or to divide any portion of the population in two parts for the purpose of running controls.

These records, as indicated in Tables II and III, show that the incidence of pneumonia was about four times as great and the mortality rate was four times as great in the uninoculated as in the inoculated.

COMMENT

It is a difficult matter to estimate the value of prophylactic vaccine as used in this epidemic of so-called influenza. Bacteriological findings show that the kinds and strains of bacteria, found complicating the disease, vary in different districts, and even at different stages of the epidemic in the same district. The disease is known to vary in severity in localities not widely separated

geographically, and during different stages of the epidemic in the same localities, so that in estimating the value of a vaccine these facts should receive careful consideration.

I believe the vaccine used as a prophylactic for the members of the Canadian Expeditionary Force of this district to have been of value. The incidence of pneumonia was less than one half and the mortality rate less than one fourth in the inoculated as compared with the uninoculated, admitted to the Special Military Hospital under similar conditions. The mortality rate for the city for the period of time under consideration was 6·28 per thousand; 53·6 per cent. males and 75 per cent. of these were at the age known as "military age". The mortality rate of the soldiers in the city for the same period of time was 2·5 per thousand.

The statistics obtained from the physicians as to the use of the vaccine in civil practice appear favourable.

THE London County Council, England, has decided to establish a number of schools for tuberculous children. Four years ago it was estimated in London 1,000 children were excluded from the elementary schools on account of tuberculosis. A sub-committee gave the number of children definitely notified as tuberculous as approximately 2,000, and, in addition to these, 2,000 other children required open-air education owing to anæmia, debility, or incipient tuberculosis. It is proposed to establish twenty day schools, each accommodating 100 children for the definitely tuberculous. The schools will be provided in the outlying parts of London, preferably in large private houses with grounds of fair dimensions (though some disused army huts may be adapted for the purpose), and near a tram route. For the 2,000 other children not notified as tuberculous, but needing open-air treatment, eight open-air schools are to be provided, in addition to the two already in existence. Admission to both classes of schools will be restricted to children who have been certified by the school medical officer. The capital cost of the whole scheme will be about £108,000, with £58,000 a year for additional maintenance.

PROTEIN MILK POWDER*

ALAN BROWN, M.B.

AND

IDA F. MACLACHLAN, B.A.

MUCH has been written concerning protein milk in pediatric literature, till now scarcely an institution dealing with children in America would be without its use, yet in spite of its widespread employment among pediatricians, it still remains almost unknown to the general practitioner.

For many years, physicians working on the problem of artificial nourishment of infants have endeavoured to ascertain the reason for the difference in tolerance for cow's and mother's milk. All the constituents of the milk have been blamed at various times for the bad results, and it is probably true that the misfeeding of any one element may cause trouble.

Chemically speaking, cow's milk and mother's milk are not unlike; to be sure, the protein of cow's milk is higher and is coagulated in coarser curds in the stomach. The next most striking difference is in the salt content, or the whey; mother's milk having 0·2 per cent., while cow's milk has 0·7 per cent.

Finkelstein of Berlin, who initiated protein milk to the profession, tried a unique experiment. He fed a series of infants on cow's milk casein, and mother's milk whey, and found that the infants thrived as though they were taking mother's milk. In another series he fed cow's milk whey and mother's milk casein and found that these babies were subject to the same troubles as though they had been fed plain milk and water mixtures. From these observations he concluded that most of the trouble in the artificial nourishment of infants lay in the whey, or, more properly speaking, the whey concentration with a secondary pathologic fermentation of carbohydrates and fat.

A few years ago it was the general idea that all of the acute gastro-intestinal upsets were due to infection of the gut tract, and whereas this is true in a small percentage of cases, it has been

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Read at the stated meeting, Academy of Medicine, Toronto, March, 1919.

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proven that most of these cases are primarily due to intestinal cell harm caused by whey concentration with an overstepping of food tolerance.

We do not now look as much as formerly for the kind of flora of the intestinal tract, but instead we determine the variety of bacteria by the food that is given. This at first glance appears queer, but it is nevertheless true. The frequent, acid, green, explosive stocls are the fermentative stools caused by the whey or carbohydrate concentration with the fermentative bacteria acting on the carbohydrates and fats. These saccharolytic bacteria produce irritative fatty acids with increased peristalsis and mucus. This type of stool wastes the sodium and potassium salts with consequent demineralization and relative acidosis which adds to the toxæmia. There is also a large water loss depending on the type of child and previous feeding.

A child can be rated as a good or bad child, depending upon its water-binding power or its water stability. Thus a child which has been fed on a poorly balanced high carbohydrate mixture such as is present in all patent foods, may lose one third of its weight in two or three days, while another child having the same disturbance may lose slightly or not at all. Thus the child's water binding power has a great deal to do with the prognosis and treatment. In the administration of protein milk with its large protein content, by adding to it sugar which is not easily fermented (dextri-maltose), we produce, instead of pathologic fermentation, a condition of putrefaction which changes the acidity of the intestinal contents to alkalinity, the peristalsis is decreased, the intestinal contents pass slowly through the large intestines with absorption of fluid and excretion of calcium and magnesium salts. These minerals unite with fatty acids to form the typical fat-soap-clay-coloured constipated stools characteristic of protein milk feeding, and it is at this point that dextri-maltose should be added to the food. In these stools the potassium and sodium and water loss is stopped, but the calcium and magnesium retention is lowered; however, this does not mean a negative balance, because of the increased salt ingestion.

Indications for the Employment of Protein Milk

In severe cases of diarrhœa which do not respond to the elimination of carbohydrate in the usual milk mixtures, protein milk is indicated, as in practically all cases of intoxication and infectious diarrhœa and many cases of dyspepsia in breast-fed infants. We

have also found it most useful in chronic intestinal indigestion in older children. Last but not least, is its employment most essential in the preliminary corrective stage of atrophy or marasmus.

Duration of Administration

The length of time that protein milk should be continued depends primarily on the digestive condition and secondarily on this factcr plus the gain or loss in weight. If at the end of two or three days on protein milk there is no improvement in the number or character of the stools, with even slight gain in weight, no addition is made to the diet until the stools assume the appearance characteristic of a pure protein milk diet. This will come about usually in four to eight days and the stools then are quite regular, one or two daily, very large, light yellow, of the consistency of putty, rather dry, without odour and are free from any unmixed particles or mucus. If on the other hand, in the first few days there is loss of weight—and this is more frequently met with than gain—on the first appearance of betterment in the digestive condition, additions to the protein milk are begun.

The corrective period naturally divides itself into three stages:

1. That in which the protein milk alone is given.
2. That in which the protein milk plus dextri-maltose or barley flour is given.
3. That in which the protein milk plus a small amount of plain milk dilutions is given.

The majority of the cases were kept on protein milk for a period varying from three to four weeks, and, in many instances, contrary to the usual opinion, we were able to keep the children on protein milk plus starch and dextri-maltose, sufficient for their caloric needs for a period of several months, in each instance accompanied by a substantial gain in weight and normal increase in vigour and tissue turgor with comparative freedom from digestive symptcms. There was usually experienced little difficulty in weaning to an appropriate milk mixture, and only in rare instances was it necessary to return to the previous protein milk feeding.

The usual duration of the first stage was from six to eight days. In exceptional instances it being impossible to add carbohydrates before the third week.

As soon as the digestive condition showed some improvement, the first step towards increasing the food value was made by the addition of malt sugar in the form of dextri-maltose. This should

be added gradually to the day's supply of food beginning with one teaspoon and increasing to one and a half to two and a half ounces. Occasionally, when the carbohydrate tolerance was extremely low, cooked barley flour was added gradually up to one and a half ounces, as this appeared to exert a less laxative action. The caloric value of both these food elements being respectively one hundred and twenty and one hundred calories to the ounce, it was thus possible to fill soon the infant's needs by these additions.

The average duration of the second part of the corrective stage varies from two to four weeks and in many instances for as long as eight months. Those that were kept on protein milk plus carbohydrate for any considerable period showed a consistent increase in weight. It was found that the addition of milk and water mixtures could be made either gradually or suddenly, and rarely was it necessary to return to the original protein milk feeding. In many cases protein milk was used in conjunction with the breast milk feeding.

Preparation of Protein Milk

Method—(32-ounce quart of milk used in this formula)

A quart of certified raw milk is taken; two teaspoonfuls of essence of pepsin are added. Warm mixture to 140° F.; keep at this temperature ten minutes, as too great heat will cause the curd to become tough. Then let it stand at room temperature for half an hour. The curd is then separated from the whey and placed in a cheese-cloth bag and allowed to drip in the refrigerator over-night. The curd is then worked through a fine sieve (thirty-six wires to the inch) at the same time adding one pint of a low acid buttermilk and one pint of water, or water to make to one quart. To every quart of finished protein milk add one grain of saccharin.

The buttermilk used is made from fat-free milk.

When using, the feeding must be warmed only slightly so as not to curdle the milk.

Precautions to be Observed in Making Protein Milk

1. (*a*) Fat content of protein milk would be reduced by churning some of it into butter. To prevent this, all ingredients, curd, buttermilk and water should be absolutely cold when being worked through the sieve. A warm temperature would help in the separation of cream into milk and butter.

(*b*) The masher should not be worked with a rotary motion.

Pressure should be used each time to get the curd through, with the minimum amount of churning of the milk.

2. (*a*) As the curd is being put through the sieve it must be kept dripping wet with the buttermilk and water. If pressed through fairly dry, it clots on the underside of the sieve. These clots of fine curd never become evenly distributed through the milk except by putting again through the sieve.

(*b*) If more liquid is required to keep the curd wet than the necessary proportion of buttermilk and water, some of the protein milk already sieved may be used again.

This seems a long, difficult, unnecessary procedure, and many modifications have been tried, always with more or less failure, so it would seem advisable to adhere rigidly to the directions set forth. The technique has only been adopted after four years careful experimentation with various procedures.

The great disadvantages of the liquid product may be briefly summed up as follows:

1. Its difficulty in preparation.
2. Its perishable nature.
3. To a lesser extent the trouble experienced in feeding it to infants.

These difficulties almost wholly exclude it from being generally employed by physicians, thus greatly reducing the number of infants that might be materially benefited by its use. It was with the intention of overcoming these difficulties that we thought of manufacturing it in powder form. Many obstacles arose and considerable experimentation was done before we were able to obtain a uniform and satisfactory product which conformed to the analysis of the liquid preparation.

TABLE OF MILK ANALYSES "PROTIEN B"

MADE FROM 4 PER CENT. MILK

Sample Number	Date 1916	Moisture %	Ash %	Protein N x 6.25%	Sugar %	Fat %
	June	93·80	0·51	2·94	1·69	1·80
76	12	93·46	0·50	2·98	1·61	1·78
77	13	95·69	0·44	3·16	1·54	1·20
		95·39	0·48	3·09	1·54	1·15
78	14	93·55	0·57	3·08	1·73	1·45
		93.44	0·57	3·10	1·78	1·46
79	15	94·29	0·54	3·05	1·80	1·31
		94·07	0·54	3·13	1·78	1·30
80	16	93·55	0·60	3·16	1·57	1·49
		93·59	0·58	3·33	1·57	1·54
81	17	92·36	0·59	3·51	1·33	2·05
		92·89	0·60	3·44	1·35	2·06
82	18	93·96	0·63	3·47	1·65	1·96
		92·89	0·61	3·42	1·61	1·91
83	19	94·65	0·51	2·75	1·61	1·72
		94·73	0·48	2·69	1·57	1·71
84	20	....	....	3·21	1·54	1·41
		....	....	3·01	1·50	1·26
85	21	....	....	3·40	1·63	1·68
		....	....	3·35	1·65	1·59
Average	.....	93·96	0·55	3·16	1·60	1·59

We have in this mixture a high protein food with a finely divided curd and a moderately high fat content. The whey is the whey of buttermilk or is the mixture diluted one-half, in this manner making the total salt content slightly less than cow's milk. The milk sugar, which is the carbohydrate of milk, is very much reduced, making it possible to add the less fermentable mixture dextri-maltose as the carbhoydrate. It is important to bear in mind that a low acid buttermilk or lactic acid milk is employed, preferably with an acidity not greater than ·36.

According to Courtney and Fales, the total salts of the ash are greatly in excess of those of mother's milk. The amount of calcium is nearly five times and the phosphorus nearly seven times as great. The soluble salts also are nearly twice as abundant in protein milk. To this large excess of insoluble salts, especially calcium, is no doubt to be ascribed the value of protein milk in producing formed stools. From Courtney and Fales' observations there is no basis for the statement that protein milk is low in salts and this is certainly confirmed by our own analyses. In fact, the total ash content is higher than is ordinarily fed to infants, even when protein milk is diluted, the amounts are much greater than nursing infants receive.

The average composition is:—Fat 1.6 per cent.; sugar 1·6 per cent.; protein 3·16 per cent.; ash 0·55 per cent.; giving a caloric value of ten to the ounce. It would thus require half an ounce of dextri-maltose to twenty ounces of protein milk to raise the sugar content to 3·5 per cent.

Technique of Administration

Children usually take this milk readily, the only difficulty being encountered when it is given to children over a year, when, in order to get them to take the mixture, it is essential to starve them; in exceptional instances, it should be given with a stomach tube. The milk should not be heated too rapidly nor above 90° F. otherwise tough masses of casein are likely to form. A large hole in the nipple is necessary and the feeding should be interrupted and the bottle thoroughly shaken every one or two minutes in order to keep the casein from settling to the dependent part of the bottle while the fluid portion alone is being consumed.

On account of the limited use of protein milk because of the present method of preparation, we deemed it wise to prepare, by a standard method, the food in a powdered form. Through co-operation with the Canada Milk Products Company, we have been able to prepare it in the following manner. The various ingredients consisting of pasteurized fat free milk, casein, cream, lactic acid starter are mixed in the proper proportions in an enamel lined tank equipped with a propeller. This mixture is then rapidly dried by spraying through a jet of hot air. The preparation is thus instantly transformed into a powder having a moisture of less than two per cent. At no point in the process does the temperature rise beyond that of pasteurization,

except during the period of removal of the moisture which requires only the fraction of a second.

Altogether fourteen batches have been prepared, each batch carefully analyzed and clinical observations made on batches one and two. One of our great difficulties was to obtain a proper acidity with a low lactose content.

It will be seen from the tables that batches one and two conform most uniformly to what is required. The only objection being that the lactose content is twice that of the original liquid preparation. From a clinical standpoint this increase has apparently offered no serious objections. In the accompanying table depicting the acidity it will be observed that the acidity of the powder is a little more than one-half that of the liquid preparation. This, too, has given no serious objection clinically as far as observations have been carried.

The preparation of an ideal powder has presented more difficulties than we expected, and we are still working to obtain a product as nearly perfect and stable as possible from every point of view.

The final product will approximate the analyses shown in table 2, batches one and two with the sugar possibly a little lower. A uniform product can be made with the acidity about 3·3 per cent. The powder, when mixed, will look like milk and usually does not settle for at least twenty-four hours; if, however, it does, it will readily mix with slight agitation.

PROTEIN MILK POWDERS

AVERAGE OF TWO DETERMINATIONS

	1 2-10-18	2 2-10-18	3 2-10-18	4 9-10-18
Moist	1·39	0·87	2·07	1·76
Ash	6·28	6·20	7·29	4·23
Protein	34·24	34·39	33·86	28·17
Carbohydrates	36·33	36·22	34·05	25·48
Fat	17·53	17·85	18·60	36·21
Lactic Acid	3·67	3·62	2·31	3·39
Total	99·44	99·15	98·18	99·24

ACIDITY TEST

GMS. LACTIC ACID PER 100 C.C. 1 TO 10 (WT.) PROTEIN MILK POWDER MIXTURE
AVERAGE OF TWO DETERMINATIONS

	H.S.C.	1	2	3	4
7-11-18					
11.00 a.m.	0·615	0·337	0·347	0·216	0·321
1.00 p.m.	0·672	0·351	0·347	0·227	0·309
3.30 p.m.	0·743	0·345	0·347	0·225	0·349
5.00 p.m.	0·774	0·351	0·343	0·227	0·357
7.00 p.m.	0·809	0·353	0·341	0·227	0·360
8-11-18					
9.30 a.m.	0·914	0·358	0·349	0·256	0·402
11.30 a.m.	0·944	0·362	0·351	0·264	0·408
1.30 p.m.	0·952	0·377	0·356	0·287	0·418
3.30 p.m.	0·972	0·402	0·368	0·318	0·433
5.30 p.m.	0·979	0·441	0·383	0·350	0·446
9-11-18					
9.30 a.m.	1·013	0·716	0·697	0·740	0·553
11.30 a.m.	0·984	0·751	0·720	0·754	0·558

The chief advantages of the powder may be briefly summarized as follows:

1. It may be kept for at least three to four months and possibly longer.
2. It may be mixed with either cold water or water to 110° F. without any separation of the curd.
3. It flows through the nipple in a manner comparable to that of whole milk dilutions; thus obviating the necessity of shaking the bottle frequently or removing the nipple.

The clinical observations on infants on the powder have been most encouraging and have excelled our fondest hopes. Generally we feel that the children have reacted more rapidly and have made a more consistent gain in weight with the use of the powder than with the liquid preparation. From the chart it will be seen that the stools became normal in a shorter space of time; that there was a more consistent gain in weight. It is to be noted, however, that as yet we have had no opportunity of trying the powder in severe summer diarrhœa; but judging from our observations so far we

COMPARATIVE CLINICAL CHART

Age	Powdered Preparation—50 Cases						Liquid Preparation—100 Cases					
	No. of cases	Condition on Admission			Reaction		No of cases	Condition on Admission			Reaction	
		Moribund	Acutely ill	Not ill	Stools	Wt.		Moribund	Acutely ill	Not ill	Stools	Wt.
1-3 mos.	15	1	6	8	Pasty in 3 days	Gain 5 oz.	20	3	10	7	Pasty in 5 days	Gain 1 oz.
3-6 mos.	21	1	12	8	3 days	Gain 3 oz.	25	2	10	13	9 days	Loss 1 oz.
6-12 mos.	10	0	4	6	4 days	Stationary	46	4	9	33	11 days	Loss 1 oz.
12-18 mos.	4	0	2	2	4 days	Gain 3 oz.	9	0	2	7	6 days	Gain 2 oz.

feel that the results with the powder will be as satisfactory if not more so, than with the original liquid preparation.

The authors desire to express their appreciation of the helpful co-operation of Drs. Alan Canfield, George Smith and Howard Spohn for many clinical observations; to Miss Farmer and Miss Stalsmith for numerous suggestions and much work in the preparation of the powder and to Dr. Roy Simpson for the tabulation of the clinical results.

BIBLIOGRAPHY

1. FINKELSTEIN and MEYER, Berlin, 1910—*Uber Eweissmiech.*

2. COURTNEY and FALES.—"The Composition and Preparation of Protein Milk." *Am. Jour. Dis. of Child.*, vol. x, No. 3, page 172.

3. WILCOX and HILL.—"Protein Milk as a Corrective of Digestive Disturbances." *Am. Jour. Dis. of Child.*, vol. v, No. 4, page 297.

4. ARNOLD.—"Eiweiss Milk." *New York State Journal Medicine*, February, 1915.

5. BROWN, SPOHN and MACLACHLAN.—"Protein Milk—Its Composition, Preparation and Application in the Treatment of Digestive Dustirbances." CAN. MED. ASSOC. JOURN., June, 1918.

INTESTINAL OBSTRUCTION AND ITS RELATION TO THE GENERAL PRACTITIONER

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THE subject of intestinal obstruction is of particular interest to the physician, as well as to the surgeon, because he is so frequently first called in attendance. Consequently the life of the patient often depends on his quick recognition of the serious nature of the case and the necessity for prompt treatment. It must be remembered that there are many ways in which the onward passage of fæces may be prevented and so give rise to separate names such as volvulus, intussusception, strangulated hernia, etc., yet the essential point to bear in mind is that a portion of the bowel is obstructed. This must be recognized, regardless of whether the differential diagnosis can be made out or not, else death of the patient will soon follow. Let us consider for a few moments some of the causes and varieties of intestinal obstruction, which may account for different degrees of severity of symptoms. Clinically these cases may be considered to be acute or chronic. These again may be placed roughly into three classes always remembering that two or more may be in combination, namely:

1. Those within the lumen of the bowel, such as impacted fæces.

2. Those involving the bowel wall, such as carcimona.

3. Those outside the bowel, with which it may come into apposition or from which it may receive pressure, such as hernial openings, bands of adhesions, tumors of other organs, etc.

The symptoms and signs may vary in intensity according to the variety or completeness of the obstruction. The greater the amount of strangulation present the more severe the symptoms. Nevertheless, whether severe or not, these symptoms will appear in fairly definite order. The first is usually pain. In acute obstruction with marked strangulation this is most intense and

Read before the Simcoe County Medical Association, 1918.

almost constant. It is felt usually all over the abdomen but may be referred more particularly to the umbilical region. In less acute cases the pain is paroxysmal. In most cases the pain is soon accompanied by vomiting. The stomach contents first appear, then yellowish or greenish coloured fluid, and after a time very foul-smelling vomitus, which has a fæcal odour. But let me warn you not to wait for fæcal vomiting before making your diagnosis or deciding that operation is necessary. Frequently the patient takes a laxative with the hope of obtaining relief, but finding none, now sends for the doctor. With the foregoing history to hand he should immediately make search of the hernial apertures, and if he finds no cause in these, he should immediately examine by further direct inspection and palpation. It may prove very difficult on account of tenderness or distension to find any deep-seated mass. If the tenderness is fairly well localized, it will direct one to the area of trouble. If the patient is not too fat, you may also get some aid from the region of the distension. Where you are able to see evidence of peristalsis, but no flatus or fæces being expelled, look for obstruction in the small intestine. If you can see the outline of the ascending or transverse colon, obstruction of the large bowel should be suspected. Should the muscular rigidity be very marked, whether there is much distension or not, beware of considerable strangulation or perhaps an acute inflammatory condition, such as appendicitis or peritonitis. The patient may have one stool and then constipation becomes absolute—even repeated enemata returning clear. It is important in giving the enema that no air remains in the tube so that there will be no mistake as to whether flatus is expelled or not. Other signs sometimes present are tenesmus, passing of bloody mucus, thoracic breathing, sunken eyes, and later, marked thirst. In the more acute conditions the patient may be curled up and have the appearance of suffering extreme agony, his temperature being subnormal and pulse small and weak. The chronic cases or those with no strangulation will have this appearance only during the paroxysm. You may have noticed that I have referred frequently to the presence or absence of strangulation as having considerable bearing on the severity of the case. This is because of the nutritional changes which take place in the tissues, these being the result of interference with the blood supply.

The experimental study of intestinal obstruction by Brooks, Schumacher and Wattenberg[1] shows how important it is to give relief before the circulation of the affected bowel becomes dis-

turbed. By repeated experiments on dogs they found that by tying a loop of gut at both proximal and distal ends and then ligating the veins in the mesentery of the occluded portion, the animal soon became desperately sick and died inside the twenty-four hours. After death it was found that the mucous membrane of the occluded bowel was completely destroyed. The contents of the loop consisted of thick bloody fluid of foul odour. This, however, was not extremely toxic as 30 c.c. injected intravenously were required to kill a healthy dog.

By another group of experiments they isolated a portion of bowel and carefully turned in the ends so as to invert the least possible amount of bowel wall. The continuity of the intestinal tract was re-established by lateral anastomosis between the proximal and distal stumps of bowel. The vascular supply remained normal. In two days the animal was up and seemed quite well. In fifteen days it ate well, had no vomiting but was losing weight. After becoming drowsy, it was sacrificed in twenty-one days. The peritoneal cavity appeared quite normal except for the markedly distended loop of bowel. The drowsiness was considered to be the result of this distension to the point at which there was beginning nutritional change in the mucous membrane and a beginning impairment of its normal selective power of absorption. The mucosa of the occluded area was opaque with a few small irregular hæmorrhagic areas. The loop contents was a thick grey material of very foul odour. This proved to be very toxic as 2 c.c. injected intravenously killed a healthy dog in seven hours. The animal vomited freely, passed bloody stools and showed extreme collapse before death. That the failure to develop symptoms in these instances of simple obstruction of loops for long periods is not a result of the animal developing immunity has been proven by Dragsted, Moorehead and Burcky[2], who have shown that symptoms and death rapidly follow the ligation of the veins of such loops. It was also shown that the higher loops caused earlier symptoms and death. This was on account of more rapid distension of the bowel from a greater secretion of fluids into the lumen, and consequently more rapid nutritional changes in the mucous membrane.

The foregoing experiments, as well as those of Murphy and Brooks[3], point out the necessity of differentiating between two important factors, namely, the production of toxins and absorption of toxins. When one is called to see a case of obstruction, the production of the toxins may already be going on, but it is his duty to see to it that there is a minimum amount of absorption.

How can this be accomplished? By immediate operation. By relieving the strangulated vessels and thereby preventing the necrosis of mucous membrane. Thus by preserving the mucosa you will lessen the amount of absorption. It has been proved by a large number of investigators that the toxic substance produced in the lumen of the obstructed bowel is not absorbed by the normal mucosa. This fact has never been appreciated by many physicians or surgeons. Therefore, remember that absorption of toxins is aided by damaged mucosa, and that the mucosa is damaged by strangulation.

Wilkie[4] has made experimental observations on the cause of death in acute intestinal obstruction and suggests three theories for the high mortality in these cases:

1. Secondary peritonitis.

2. Splanchnic paresis, or draining of the body fluids into the portal area followed by cerebral anæmia.

3. Toxæmia resulting from the absorption of poisonous products from the upper bowel.

Deaver[5], of Philadelphia, reports two hundred and seventy-six cases with a mortality of 42 per cent., and he attributed this high mortality to the late stage at which many patients come for operation.

In smaller hospitals, such as ours, it is not usual to have to deal with intestinal obstruction, but one must ever be on the alert for it when dealing with acute abdominal conditions. During the past year dating from June 1st, 1917, to June 1st, 1918, I have performed nine operations for various types of obstruction, and a short synopsis of the cases and the results will serve to impress upon all the advisability of early operation.

Case 1. Baby C., first symptoms 6 a.m., May 31st. First seen about 11 a.m., June 1st. The patient was brought to hospital a distance of nine miles, and operated on at 4.30 p.m. A three and a half inch intussusception was found at the ileo-caecal valve. This was reduced and the baby made an uninterrupted recovery. Those of you who were at our meeting last year will remember seeing the case.

Case 2. Mr. R., patient of Dr. A. E. Murphy, had been subject to attacks of cramps followed by diarrhœa for two years. On the afternoon of August 3rd, Dr. Murphy was called for a similar attack of pain. Vomiting began early on August 4th, constipation was absolute and enemata did not give relief. I saw him about

11 p.m. Distension of the ascending colon was easily visible. Vomiting had become yellowish in character. I brought him to the hospital and operated about 2.30 a.m. August 5th. A mass was found in the descending colon opposite the lower pole of the left kidney. Certain glands were found enlarged and I removed one of these for examination. The pathological report showed it to be a columnar celled adeno-carcimona. I did a colostomy in the region of the cæcum. Patient made a good recovery, has gained several pounds in weight, and is now doing light work.

Case 3. Mr. R. G. Patient developed a severe pain in the abdomen after supper on September 3rd. Vomiting began about 10 p.m. First seen about 1 a.m. September 4th. There was a history of appendiceal abscess drained three years before. He also had a history of jaundice accompanied by severe pain about three and a half years before. His pain was intense and his whole abdomen was rigid. I brought the patient back to the hospital, ordered high enemata and hot local applications over the abdomen. The enemata returned clear and I operated about 10.30 a.m. and found about fifteen inches of small intestine, black in colour, being strangulated by a long adhesion no thicker in the centre than a strand of yarn. This was liberated, the colour of the loop began to improve, the abdomen was closed, and after three very anxious days the patient began to make good recovery. The vomiting had not become fæcal.

Case 4. Mr. B. M. Patient of Dr. N. L. Rogers. About 1 p.m., September 17th, pain began while patient was at work. Dr. Rogers was called and found a lump in the right inguinal region which he partially reduced. This relieved the pain, but reduction of the lump was incomplete. About 5 a.m., September 18th, the pain, accompanied by vomiting, returned. Dr. Rogers called me about 8 a.m. The patient was brought in to hospital and operated upon about 9.45 a.m., and we found the appendix in the inguinal canal. The appendix was removed through the hernial opening and a radical cure for the rupture performed. The patient made an uninterrupted recovery.

Case 5. Mr. M. H., on September 25th, about 2 p.m., complained of pain and noticed a lump in the right groin; the pain recurred at intervals and he vomited about 2 a.m., September 26th. I saw him first about 3.15 a.m., took him to the hospital, and operated about 5 a.m., and found a strangulated femoral hernia about two inches of the bowel was of a shiny black colour. Considerable brown fluid escaped when opening into the hernial sack. On re-

lieving the strangulation, the colour of the bowel improved. It was returned to the abdomen and a radical cure performed. The patient made an uneventful recovery.

Case 6. Mrs. S. W., had an abdominal operation through the median line several years before. Last year she had frequent attacks of severe pain and a mass, which was reducible, appeared to the left of the old incision. On opening, I found four apertures and four sacs with adhesions to coils of intestines in close proximity. The adhesions were broken down, the sacs dissected out, and the wall firmly closed with good results.

The next case showed undoubted signs of chronic obstruction, but I did not think the patient's condition would be much improved by operation. You may judge for yourselves.

Case 7. Mrs. C., aged seventy-five. I was called first on August 18th. She had complained of cramps at intervals for six months. I found distension of the ascending colon with visible peristalsis, but the bowels had been kept active by the use of liquid magnesia. The pain appeared at rather long intervals, so I advised the use of liquid paraffine which helped the distension and relieved the pain. I could feel a mass about the region of the hepatic flexure and diagnosed carcinoma. The patient had had what appeared to be Rodent-ulcer of the right cheek some two years before for which she refused suitable treatment. She had lost greatly in weight and strength, so I concluded that a colostomy would be about as disagreeable as her present state without offering any chance of prolonging her life. When explained to the relatives they heartily agreed. The patient died suddenly on the morning of December 5th.

Case 8. Miss V. S., aged seventeen. Just before noon, February 9th, 1918, Dr. Little, of Barrie, was called and found that this patient had been suffering from appendicitis for nearly one week. He advised immediate operation. On opening the peritoneum I noticed a foul odour and soon found a badly-ruptured appendix and considerable fæcal matter, free in the peritoneal cavity. This was mopped out, appendix removed and three large cigarette drains inserted. After a stormy convalescence, which gave us considerable anxiety, the patient began to progress favourably. The wound healed and the patient was allowed home. For nearly three weeks she had some pain in the abdomen which was relieved by enema. In the afternoon of March 28th the pain became severe and I was called in. The bowels had moved well

in the morning, so local applications were applied. The patient slept some during the night and enemata brought flatus next day. During March the 30th, the pain returned at intervals and the enemata began to return clear. There was little or no distension but a peristaltic wave could be seen when the pain came on. On opening the abdomen, there was a large band, two and a half inches long by one-third inch thick, holding a coil of intestine. The bowel was distended above and normal below it. This band was tied off as well as twelve or fifteen others. In fact, there seemed to be almost an agglutination present. The abdomen was closed, the wound healed by first intention and the patient was allowed home in two weeks.

However, on the afternoon of April 26th, pain and vomiting again occurred. There had been a fair stool in the morning. The pain was paroxysmal and there was some soreness in the left iliac region. An anema brought a large movement and flatus about 10 p.m. Another about 7 a.m., April 27th, brought more flatus and some fæcal matter. However, peristalsis was plainly visible with each pain and Dr. Little and I agreed that surgical interference was necessary. The patient was removed to the hospital and on opening the abdomen, there was a long band of omentum which extended to the brim of the pelvis and firmly fixed across a coil of ileum. The loop seemed to be half turned on its axis as if it were a beginning volvulus. All the ragged ends of omentum were removed and sterile liquid paraffine applied. The patient made a good recovery and we hope she may have no further trouble.

Case 9. Mr. J. H., aged sixty-five, patient of Dr. Simpson. The patient had been losing weight and having attacks of pain in the abdomen accompanied by constipation, which would be relieved by enemata, for about six months. On May 26th he noticed some pain and used enemata on the 27th and 28th without effect. Dr. Simpson was called and removed the patient to the hospital on May 29th. At operation, I found a circular carcimona of the sigmoid flexure and marked distension above it. I did a colostomy in the left anterior iliac region. Patient showed immediate signs of relief. In about a week he showed marked weakness and was becoming more emaciated. With the use of glucose enemata he began to improve and was able to go home about ten days ago.

In practically all these cases I advised immediate removal of the patient to the hospital, and if two or three high enemata were not successful, immediate operation. I did not wait for, nor want

to see, fæcal vomiting. To these points I attribute the happy results in each of the cases where operation was performed.

A word as to treatment. In a subject so comprehensive as this, I shall not attempt to outline the surgical technique to be followed in the different types of intestinal obstruction. Suffice it to say that in the acute or markedly distended case the simplest operation that can be performed and that will produce good drainage, is the best. While it is important to have the operation carefully and skilfully performed, let me impress upon you that it is not the most important thing. *The most important thing is to have it performed early.* Do not wait for fæcal vomiting. When vomiting of the later stages makes its appearance it indicates that there is already a large collection of poisonous material in the bowel and that the prognosis is grave. Do not wait to diagnose between different varieties of obstruction. What does it matter whether it be a volvulus, or an internal hernia? There is one thing indicated, and that is, immediate operation as soon as you can come to the conclusion that there is a mechanical stoppage to the onward passage of fæces and flatus anywhere in the intestinal tract. Deaver[6] states "that it is not too much to say that acute abdominal pain which causes vomiting, unassociated with diarrhœa is, in nine cases out of ten, due to a condition best treated by immediate operation. With all the diagnostic acumen available, it is frequently impossible to do more than guess at the nature of an obstruction and, after all, the improvement of our mortality from earlier operations rests upon the ability of the practitioner to size up his case as one which has suffered an abdominal catastrophe necessitating operation." Therefore, remove the patient to the hospital before he becomes exhausted by pain and treatment. If not convinced of a possible obstruction, give a high enema. This will clear away most of the fæcal matter in the large bowel. Repeat in a few minutes, making sure that there is no air in the tube and note whether flatus is expelled or any amount of fæces passed. Local application of heat may be applied in the interval. Another important point is to withhold all water, nourishment and cathartics. The latter especially add to the danger and mortality. Do not give morphia. The only possible exception to this is where you have made your diagnosis, you have got the patient's consent to an operation, the pain is intense and you have to move him several miles to the hospital. Even then do not give more than one-sixth of a grain. The first duty of every medical man is to save life, the second is to alleviate pain. With the patient moaning and groaning while you are trying

to extract a meagre history of the case and begging for relief when you attempt to make an abdominal examination it is but natural, I quite admit, that you may be sorely tempted to acquiesce to the demand and so place your second duty first in order that you may comply with the sentiments of the patient, and of the onlookers and also to give your brain a chance to think. But let me warn you not to let your sympathy over-rule your better judgment in any case which has the slightest suspicion of intestinal obstruction. Again, I say, do not give morphia. If you must temporize, do so with enemata, local applications, etc., for two very good reasons. First, the use of enemata is one of the means of helping to prove or disprove the condition and may relieve pain. Secondly, if an operation is indicated, you will get the patient's consent to it and that of his friends by simply stating the facts of the case, and the necessity for immediate interference, while if you have lulled him off to pleasant slumbers by the use of an opiate, you may suddenly realize that you are having to persuade and urge your patient to undergo something which he considers quite unnecessary. Furthermore, if an unhappy result should follow the friends will place the onus of responsibility upon you, because of the urging, persuasion, etc., rather than on the acute condition present.

Without enlarging on the subject further, I believe the following conclusions may fairly be drawn:

1. The rapidity with which the accumulation of deadly toxic material takes place in the gut above the obstructing point and the danger that is thereby added to the simplest abdominal procedures are not sufficiently appreciated.

2. It is the gangrene consequent upon delay, the peritonitis set up by the migration of organisms through the damaged walls, the absorption of poisonous accumulations in the gut and the necessity for performing extensive and less favourable operations on account of added pathology due solely to delay, that are responsible for the usually heavy mortality.

3. In the majority of our text-books the characteristic features are beautifully delineated, fæcal vomiting is emphasized, but nowhere is it stated, that to wait for classical symptoms is in a large percentage of cases to invite death to the patient and court condemnation of the medical attendant.

4. Be frank with your patient. Explain that you suspect a possible obstruction and that surgical interference may be necessary. If enemata do relieve him you will find him most grateful for having

saved him from the operation, and on the other hand, if such has to be done, he will admire and appreciate how quickly you suspected the condition.

5. And lastly, do not give morphia. It will prove a delusion to your patient and a snare to yourself.

References:

1. Brooks, Schumacher and Wattenberg.—"Annals of Surgery," February, 1918, page 210.
2. Dragstedt, Moorehead and Burcky.—*Jour. Exp. Med.*, 1917, xxv, 421.
3. Murphy and Brooks.—*Arch. Int. Med.*, 1915, xv, 392.
4. Wilkie.—*Br. Med. Jour.*, 1913, ii, 1064, and "Med. Annual", 1915.
5. Deaver.—*Ibid*, 1915, i, 198, and "The Med. Annual", 1916.
6. Deaver.—"The Medical Annual," 1911.

THE HALIFAX MEDICAL SOCIETY

This Society held two largely attended meetings at Camp Hill Military Hospital by kind permission of Colonel MacKenzie, officer commanding the military hospitals in Halifax. The meeting on February 19th was given up to demonstrations of the surgical aspects of nerve lesions in returned soldiers. Some instructive conditions were demonstrated by Captain V. L. Miller, C.A.M.C. At the meeting on March 19th, a number of interesting medical cases were demonstrated by Dr. A. Birt, consultant in medicine to the hospital. The Society held its annual meeting on April 23rd in the City Chambers. The retiring president, Professor John Cameron, was in the chair. The Mayor of Halifax, Dr. Hawkins, was elected president for the ensuing year. Captain Roy Lindsay, C.A.M.C., was elected secretary-treasurer.

A committee was appointed to wait on the Halifax Relief Commission with a view to see whether the history of the medical aspect of the disaster could not be published as a separate volume, instead of waiting to be incorporated in the final report of the commission.

John Cameron, M.D., D.Sc., F.R.S.E., professor of anatomy in Dalhousie University, has been elected a Fellow of the Royal Society of Canada.

ARTHRODESIS OF THE HIP JOINT AND ITS INDICATIONS

By J. A. Nutter, M.D.

Montreal

THE operation under discussion is one designed to produce bony ankylosis in the hip joint, and thus to afford relief to a class of sufferers for whom formerly but little could be done.

All here have doubtless been called upon to treat adult patients with crippled and painful hips. By this is meant patients who have for long suffered from some form of arthritis of the hip joint, usually termed chronic rheumatism. The result of this long continued arthritis is often the destruction or crippling of the joint involved, as shown by deformity, shortening of the leg, great restriction of motion, and pain on walking. The question of the treatment of the original arthritis, of whatever source, is not meant to be discussed here. It may have been tubercular, gonorrhœal, traumatic or otherwise at the onset. What we are now concerned with is the problem of affording relief to the patient with a stiff, painful, and often deformed hip joint.

Let us take a typical case of arthritis deformans of the hip joint in an adult. The *X*-rays show a mutilated joint, the mechanism of which is destroyed by loss of bone and articular cartilage, and in certain cases by extensive hypertrophic deposits of bone along the joint margins. The ligaments are fused and adherent to the underlying joint structures. A small amount of motion is left, but weight-bearing is painful, and only too often a single unguarded movement causes intense agony. There is probably flexion deformity. The original disease, the source of all the trouble, seems to have run its course, leaving the patient crippled. We have, let us assume, tried to alleviate his suffering by baking, massage, fixation of the joint by various measures, manipulation to break up the adhesions, cures at various springs and hot baths—and still our patient has to walk slowly and painfully with crutches or a cane.

Why does he suffer? It is not because the arthritis is still active. It is because his hip joint, as a piece of mechanism, is hopelessly ruined. Movement in one direction causes a painful pull

on some tender adhesions, movement in another causes roughened joint surfaces to grate together. It is *because* of his movement in the hip that he suffers, and if he had *no* movement his pain would be gone. We know, for example, that patients with tubercular hip disease, if left with bony ankylosis, suffer no more pain. Not only do they not suffer, but they run very little risk of recurrence of their disease. Joint disease quickly disappears when the joint is no more, and without motion there is no pain.

Our friends the veterinarians have for years practised the artificial production of ankylosis in various joints of the horse for the relief of pain and disability. The veterinary surgeons stiffen the joints of the hock, for example, by the deep introduction of the actual cautery into the joint until synovial fluid escapes. With this they combine the injection of irritants, such as the iodide of mercury, setting up a violent arthritis which results in ankylosis of one form or another. This procedure, I am assured, gives good results.

It is now about ten years since Albee of New York described an operation to stiffen and immobilize the hip joint by bony ankylosis. He advocated it, and first practised it, only in cases of arthritis deformans of the hip joint in adults, where in spite of all palliative measures, pain persisted and the patient remained crippled. Albee practised an anterior approach to the hip, and with a chisel levelled off the upper surface of the femoral head and the adjoining upper portions of the acetabulum. In this way he brought raw bone surfaces together, which in the course of a few months became firmly united. A plaster spica was applied after the operation with the thigh in abduction, and after a few months the patient had a painless but stiff hip joint, which bore weight well. The freedom from pain was due to the absence of any motion in the hip.

Albee's original operation for arthrodesis of the hip joint had a somewhat limited field of usefulness. It was practised by him as before only in cases of hypertrophic arthritis of the hip. Brackett of Boston has for some time been engaged in improving the operation, and has, in addition materially enlarged its field of usefulness. In a paper on the different approaches to the hip joint (*Boston Medical and Surgical Journal*, February 15th, 1912), Brackett points out the difficulty of reaching anything but the neck of the femur, and the edge of the head by the anterior approach. It may be well to note at this point that the so-called anterior approach to the hip joint, as used by Albee, is through an incision from the anterior superior spine downwards. The sartorius and the tensor

fascial femoris are separated, while the deep-lying rectus femoris and iliacus are retracted to the inner side. With strong retraction a limited view is offorded of the femoral nerve and a small portion of the head.

An approach allowing a much freer view of the hip joint is afforded by the so-called latero-posterior route, which Brackett recommends for such an operation as arthrodesis. Here the incision is from the anterior superior spine downwards and backwards to the great trochanter, then directly downward along the femur for two inches, with a short backward incision where the two first incisions meet. The tensor fasciae femoris and the gluteus medius are separated, the fascial expansion of the gluteus maximus is cut through in the line of the posterior incision, and the great trochanter, with its many muscular attachments, is exposed. The upper part of the great trochanter is then chiseled free, carrying with it the gluteus and other muscles which overlie the femoral neck and head. After reflecting these upward and backward the joint capsule is exposed. On opening this a splendid view is afforded of the hip joint, and with a chisel the contiguous surfaces of femoral head and acetabulum are shaped to afford flat bony contact over as great an extent as possible. In closing the wound the trochanter is wired into place. A spica is applied with the leg in abduction, to remain on several months. This spica is at first made double, to include the well hip and thus to increase the immobilization.

The cases where arthrodesis of the hip seems to be specially indicated are as follows:

1. Monarticular hypertrophic arthritis of the hip joint, particularly in working people who need a straight weight-bearing leg. Nature tends in time to afford a cure for this distressing affection by producing gradually a stiff joint. The operation greatly shortens the period ot disability. It is for this class of patient that Albee originally advised the operation. One must be careful not to operate on too heavy or too old patients, or where there is active disease in the other leg.

2. Deformity with or without pain, in adults following hip joint disease of childhood, in which ankylosis is not complete. Such joints afford a perpetual menace owing to the danger of recurrence of active disease. Such joints are quite often painful, this being due to excessive joint strain in a mutilated hip. By the arthrodesing operation, not only is pain and deformity re-

moved, but the patient is assured against a return of active disease. Such cases must be chosen with care.

3. Deformity with incomplete ankylosis after acute infectious arthritis of the hip (*e.g.*, gonorrhœal arthritis). This is perhaps the most favorable class to operate on. One has not to wait so long after the subsidence of the arthritis as in the case of tubercular hip disease.

4. Traumatic conditions and old fractures of the femoral neck, where deformity persists with disability and pain.

To summarize briefly:—In cases of persistent and painful disability at the hip, an operation for arthrodesis affords great relief from pain and gives a good weight-bearing leg.

For the past five years the public demand for dental service has been greater than the normal supply of operators, and it is the opinion of the leaders in the dental profession that women can relieve the situation by taking up dentistry as a vocation. They can specialize in the treatment of diseases, which is a most essential work, and thus enable the men to devote their entire time to the practical side. Owing to the great demand made on modern dentistry, and unusual war conditions, which have absorbed a large number of doctors in special work, it is also the hope of the profession in general, that a course for women dental assistants will be opened in the near future. It should cover a space of time from three to six months. During the course the assistants would be detailed to the senior students to assist with infirmary patients. Their training would be made similar to that given a nurse in order that they might be fully qualified to be of the same assistance to the dentist that the trained nurse is to the doctor. In every activity to-day less skilful employees are used, wherever possible, to relieve the more highly trained operator, and unless some plan as has been indicated is formulated, it will be impossible for the dental profession to cope with the situation.

Editorial

THE SECOND INTERIM REPORT OF THE PUBLIC WELFARE COMMISSION OF MANITOBA

TO no class of citizen should a report of this kind appeal as to the members of the medical profession. Their life work brings all of them in intimate contact with the conditions that investigations of this kind seek to remedy. It is on this account it is recommended to all readers and not only to those of the province concerned.

The first half of the report deals entirely with hospitals. The broad comprehensive view taken of this subject makes it particularly fascinating to those interested in medical education. The Commissioners have carefully studied the most advanced work on this subject and have given it their most enthusiastic support. The duties of a hospital in the direction of education are explained at length as they apply to medical students, the staff and medical profession, nurses, internes and the general public.

They advocate that the private and semi-private wards should be open to all practitioners, but that the public wards in the larger hospitals must be under the exclusive control of the medical staff to insure the best results for the patients and to permit of suitable training for the students, internes and nurses. This point of view is accepted by the profession in most parts of Canada although in some centres the use of the private wards is given only to the members of the staff. While this is a debatable point among the profession it is interesting to see what conclusion a disinterested party comes to in the matter.

The strong stand taken in regard to the necessity of doing teaching in hospitals and keeping extensive records of cases, is especially commended. It is well that these two

points should be brought impressively before the public and that the necessity of having adequate records should be brought to the attention of the profession. That hospitals may be judged very accurately by the records they keep is undoubtedly true. Those with poor case reports are always inefficient and slovenly in the other details of their work.

The question of the duties of the hospital to the interne is one that is seldom brought out as clearly as in this report. While it advocates a year's internship before a license to practice is granted, it yet insists that the hospital should give the young medical man a quid pro quo.

These points are carefully applied to the different hospitals in the province and the deficiencies of each are fearlessly shown. This is all to the good and the publicity given the matters that need remedying is bound to give good results.

The prominent place given the social service branch of hospital work is much to be commended. Their sphere of usefulness in an educational capacity for the after-care of hospital patients and for the prevention of similar diseases amongst other members of the family or community is carefully explained in the report. That this support will assist this branch of hospital work is undoubted.

The second half of the report is devoted almost entirely to the investigation of the mental hygiene of the province conducted by Doctors Clarke and Hincks. The latter have exhaustively gone over this subject as it affects the different parts of the province. While their findings show that this work was badly needed and had heretofore been greatly neglected, yet it is probably true that none of the other provinces are in a better position and some are unquestionably much worse off. If even a small portion of their recommendations are carried out at once, a distinct advance will be made.

It is clearly shown how defective our immigration policy in the past has been. The nationalities of the inhabitants of the jails and asylums, the mentally defectives, the prostitutes

and unmarried mothers, are clearly given. A very large proportion of these people come from the foreign-born inhabitants.

The report on child welfare is exhaustive and very radical in its recommendations. It is a pity that the benefits from the Mothers' Allowances Act are not given more at length so that the public from other parts of Canada might be informed of this distinctly forward move on the part of Manitoba.

A BILL to create a Federal Department of Public Health was introduced in the House recently by Hon. N. W. Rowell. The usual provisions are made for the appointment of a Deputy Minister and the necessary officers and staff. A Minister of the Crown will preside over the department. The bill also provides for the creation of a Dominion Council of Public Health, the Deputy Minister to be the Chairman; the council to consist of the chief executive officer of each Provincial Department or Board of Health with three others to be named by the Governor-in-Council.

The powers of the Minister of Public Health will extend to and include all matters and questions relating to the promotion and the preservation of the health and social welfare of the people of the country. Certain particular powers are mentioned in the bill, as, co-operation with provincial and other health authorities; authority to deal with questions relating to the preservation of child-health and child welfare generally; medical care of immigrants; supervision as regards public health of railways, boats, ships, and all methods of transportation; supervision of federal public buildings in respect to the health of civil servants and other government employees; enforcement of the rules and regulations of the international joint commission in respect to the pollution of boundary waters.

ANOTHER immigration warning has been given by the Secretary of the Canadian Committee on Mental Hygiene in the statement that more than one half of the insane and

feeble-minded in Canada have been imported from abroad. When an immigrant presents himself at one of our ports, it is an easy matter to discover how much money he has, if he has tuberculosis, and if his eyes are diseased. It is harder to pass on his mentality. What may appear stupidity or even imbecility may be only a scared ignorance of our language and customs. There is often neither time nor skill to examine the newcomer as thoroughly as the situation demands. Besides constituting one of our biggest problems, we are up against a very heavy item of expense, trouble and danger. If, as Dr. Hincks says, one-half of our problem has been provided by importation, then one avenue of redress is open to us. It would be infinitely better to spend money for prevention beforehand than for detention afterwards. The immigration regulations must be tightened. Facilities must be provided for a closer examination of immigrants. The matter is a most urgent one. Immigrants from civilized countries should be compelled to present a physician's certificate of their personal and family history (in the medical sense). This certificate should have the backing of the immigrant's government, so that the expense of detention and deportation would not fall on Canada, should the immigrant prove an undesirable citizen.

THE likelihood of a Provincial institution for the care and training of the blind was indicated by the Minister of Education recently in the British Columbia Legislature. The whole matter has been under consideration of the Government for some time. It is proposed to have a survey made this year with a view to ascertaining just how many blind children there are who would receive the benefit of such an institution. It was suggested that it would be well to have proper means taken to get into touch with the parents and point out to them the advantages to be derived from the prevailing systems of education for the blind. Many blind children throughout the province were not being dealt with and the time was ripe for a proper Provincial institution.

The Association

ANNUAL MEETING, QUEBEC, JUNE 25TH TO 27TH

PRELIMINARY PROGRAMME

Address in Medicine:—W. S. Thayer, M.D., Professor of Medicine, Johns Hopkins Hospital, Baltimore.

Address in Surgery—Jasper Halpenny, M.D., Associate Professor of Clinical Surgery, University of Manitoba, Winnipeg.

Addresses in Public Health—J. W. S. McCullough, M.D., D.P.H., Chief Officer of Health, Province of Ontario, "Sanitation and the War." J. D. Pagé, M.D., Medical Superintendent, Quebec Immigration Hospital, "Conscience publique et hygiene publique."

Address by Major-General J. T. Fotheringham, Ottawa—"The Organization of the Canadian Army Medical Corps."

SECTION OF MEDICINE

A. D. Blackader, Montreal—"A review of our present knowledge regarding the conditions of acetonuria, acetonæmia and acidosis."

D. A. Craig, London—"Physical examination of the chest."

G. G. Campbell, Montreal—"Lantern demonstration of skin diseases."

H. B. Anderson, R. W. Mann and H. M. Tovell, Toronto—"Interrelationship of mouth infection, neurasthenia and exophthalmic goitre."

L. V. Hamman, Baltimore—"The practical significance of a small amount of sugar in urine."

F. McKelvey Bell, Ottawa—"Development of medical branch, Department of Soldiers' Civil Re-establishment."

C. B. Farrar, Ottawa—"Psychiatry in soldiers' civil re-establishment."

H. A. Farris, St. John, N.B.—"The tuberculous hospital and dispensary."

W. F. Hamilton, Montreal—"Pneumothorax in influenza epidemic."

J. C. Meakins, Montreal—"Chlorine gas poisoning—late results."

E. H. Young, Cobourg, Ont.—"The care of military mental cases."

A. H. Gordon, Montreal—"Internal hydrocephalus and the Nonne-Froin syndrome."

F. G. Finley, Montreal—"A case of infected cardiac thrombosis simulating malignant endocarditis."

D. Masson, Montreal—"The effectiveness of the Allen method in the treatment of diabetes."

H. B. Cushing, Montreal—"The importance of secondary infections in the contagious diseases."

E. C. Levine, Montreal—"Indications and results of blood transfusion."

Albert Jobin, Quebec—"Heat and infant mortality."

A. Vallée, Quebec—"A case of endothelioma of the pleura with multiple metastasis." Presentation of specimens.

A Vallée and H. Laliberté, Quebec—"De l'Homogénéisation des crachats pour la recherche du B. de Koch."

James Third, Kingston—"Danger signals in cardio-vascular affections."

Fletcher McPhedran, Toronto—To be announced.

Lionel M. Lindsay, Montreal—"Infantile tetany (spasmophilia)."

L. F. Dubé, Notre-Dame-du-Lac—"Médecine et prescription."

Doctors Fortier, Leclerc, Lessard, Rousseau, Guérard—Titles to be announced.

Section of Surgery

A. Primrose, Toronto—"Tumours of the kidney."

G. E. Armstrong, Montreal—"Focal infections; ileal and colonic stasis."

C. L. Garner, Fernie, B.C.—"Cystoscopy."

N. J. Maclean, Winnipeg—"Cancer of the rectum."

Herbert Bruce, Toronto—"Efficiency in an army medical service."

A. E. Garrow, Montreal—"Report with remarks on a case of sub-total gastrectomy for diffuse carcinomatous infiltration (malignant 'leather bottle' stomach)."

E. St. Jacques, Montreal—"Metallic plates (no screws) in the treatment of fractures."

C. B. Keenan, Montreal—"Secondary extra-dural hæmorrhage of the cord."

E. M. Eberts, Montreal—"Fœtal adenomata in the thyroid and their relation to hyperthyroidism."

L. G. Pinault, Campbellton, N.B.—"Intestinal intussusception caused by polypus."

J. L. Biggar, Ottawa—"Social insurance."

A. F. Warner, Toronto—"Tuberculosis of kidney and ureter."

J. N. Roy, Montreal—"A case of foreign body in the œsophagus removed by external œsophagotomy—cure."

W. G. Turner, Montreal—"Amputations."

R. C. Powell, Montreal—"Diagnosis of surgical diseases of the kidney."

Fraser B. Gurd, Montreal—"The surgical treatment of chronic chest sinuses."

W. Hutchinson, Ottawa—"Renal calculus."

G. M. Geldert, Ottawa—"Oil-ether rectal anæsthesia with special reference to exophthalmic goitre."

Doctors Simard, Dagneau, Ahern and Lemieux. Titles to be announced.

Section of Public Health

T. H. Whitelaw, Edmonton—"The practical aspects of quarantine for influenza."

M. M. Seymour, Regina—"The Saskatchewan Union Hospital."

C. M. Hincks, Toronto—"Mental hygiene and the medical practitioner."

W. F. Roberts, St. John, N.B.—"A provincial ministry of health."

G. S. Mundie, Montreal—"The problem of the mental defective in the Province of Quebec."

Helen MacMurchy, Toronto—"Child welfare."

Eugene Grenier, Montreal—"La lutte anti-tuberculeuse est une lutte sociale: le role des gouvernements; le role des initiatives privées pour le pays."

Joseph A. Beaudry, Montreal—"Smallpox and chicken-pox epidemic in the province of Quebec."

E. M. A. Savard, Quebec—"Les ligues anti-tuberculeuses dans les districts d'inspection sanitaires."

Gordon Bates, Toronto—"Some aspects of the social hygiene problem in Canada."

A. H. Wright, Toronto—"Hygiene for the aged."

J. A. Beaudouin, Lachine—"Epidemiology."

J. E. Laberge, Montreal—"Town planning and civic authorities."

W. H. Hattie, Halifax—"Death rate above the age of forty."

T. J. Lafrenière, Montreal—"Water supplies in Quebec."

P. H. Bryce, Ottawa—"The scope of a Federal Department of Health."

H. Palardy, Montreal.—"Hygiene in lumber camps."

A. H. Desloges, Quebec—"Mental hygiene in relation to social hygiene."

Doctors Montizambert, Couillard, DeVarennes, Savary—Titles to be announced.

Section of Obstetrics and Gynæcology

Gordon G. Copeland, Toronto—"Treatment of eclampsia."

R. deL. Harwood, Montreal—"Uterine curetage; its indications, contraindications and abuses."

F. A. L. Lockhart, Montreal—"Case-book notes."

H. M. Little, Montreal.—"Albuminuria in pregnancy."

David Patrick, Montreal—"The puerperal intra-uterine douche."

H. C. Burgess, Montreal.—"The management of labour in contracted pelves."

James W. Duncan, Montreal—"The value of the pre-natal examination."

W.W. Chipman, Montreal—"Dysmenorrhœa (lantern slides)."

E. St. Jacques, Montreal—"Conservatism in gynæcological operations."

Section of Eye, Ear, Nose and Throat

L. deV. Chipman, St. John, N.B.—"Chronic affections of the accessory nasal sinuses."

G. Sterling Ryerson, Toronto—"On ocular imbalance."

S. Hanford McKee, Montreal—"The enlargement of the conjunctival sac by the use of dental compound."

G. H. Mathewson, Montreal—To be announced.

W. G. M. Byers and F. T. Tooke, Montreal—"The surgical treatment of immature senile cataract."

H. D. Hamilton, Montreal—"Benign growths of the larynx in children."

J. T. Rogers, Montreal—"Tumour of the naso-pharynx, with pathological specimens (case report).

Colin Campbell, Toronto—To be announced.
A. D. McKelvey, Toronto—To be announced.
E. R. Wells, Toronto—To be announced.
R. Craig, Montreal—To be announced.
E. Hamilton White, Montreal—To be announced.

CANADIAN STEAMSHIP LINES—SPECIAL RATES

Although it has been previously announced that there will be no special railway rates, we have just learned from the management of the Canadian Steamship Lines that a special rate, including meals and berth, will be granted to parties of ten or over.

HOTELS

The following are the rates quoted us by the hotels at Quebec:

Chateau Frontenac:

	With bath	Without bath
Single room	$3.00 to $5.00	$2.00 to $3.00
Double room	5.00 " 8.00	3.50 " 5.00
Suites (2 people)	6.00 " 8.00	
Suites (4 people)	9.00 " 12.00	

No reduction is made in the rates of $3.00 and $2.00 quoted for single rooms, the former with, and the latter without bath. From all other rates quoted, a reduction of fifty cents will be allowed to members of the Association attending the convention.

Victoria (Palace Hill)—American plan, $3.00, $3.50 and $4.00.

Clarendon (corner St. Anne and Gordon Street)—American plan, $3.00 and $3.50.

Ste. Ursule House (corner St. Louis and Haldimand Streets)—American plan, $3.50 and $4.00.

We are informed by President Grondin that the privileges of the Quebec Golf Club have been extended to the members of the Association during the period of the meeting.

THE CANADIAN MEDICAL PROTECTIVE ASSOCIATION

Following one of the general sessions, the annual meeting of the Canadian Medical Protective Association will be held. Date and hour will be announced in the final programme.

Obituary

DR. J. D. HELMCKEN

NOT only the medical profession, of which he had so long been a prominent member, but the whole community, suffered a grievous loss in the sudden death of Dr. J. D. Helmcken, which occurred on April 2nd. Esteemed alike for his ability and services to suffering humanity as a practitioner, and for his many lovable personal qualities, he filled a place in the life of his native city all his own. Born in Victoria, British Columbia, sixty-one years ago, the fourth white child in the settlement, he was the eldest son of Hon. J. S. Helmcken, who at the advanced age of nine-two survives him, having been at one time Speaker of the Vancouver Island Legislature and prominently connected with the public life of the province in the past.

Thirty-four years ago Dr. Helmcken commenced his work in Victoria, taking over his father's practice. There he remained all his life. His clientele was a wide one, his high professional attainments giving him an assured reputation. He was elected president of the Medical Society. Dr. Helmcken was the physician for the provincial jail in former years, and also the official Indian doctor. He was a specialist in children's diseases, and took a lifelong interest in St. Joseph's Hospital, identifying himself always with its varied activities. He personally contributed a handsome equipment to the operating room of the hospital. Previous to the establishment of the training school for nurses at St. Joseph's, he had prepared a course of study, and following the founding of the school in 1902 he gave a course of lectures each year. When he was carried to his last rest, the nurses of St. Joseph's were marshalled at the church doors, and through their ranks was borne the casket of the beloved physician. Broad-minded, big-hearted, with a cheery smile and hearty greeting for everybody, always ready to respond to the call of the sick and distressed, he leaves in the affectionate remembrance of thousands a monument more enduring than anything that can be fashioned out of stone or marble.

DR. ANSON BUCK

Dr. Anson Buck, M.R.C.S., the grand old man of Halton County, and one of the most notable figures in the rural portion of Central Ontario, passed away at his home at Palermo, on Good Friday at sundown. He was born in 1833 and was the last living graduate of his year in the Royal College of Medicine, Toronto. He had the distinction of practising his profession for about one year and six months before attaining the age of majority. For the past eleven years Dr. Buck was an invalid, an attack of paralysis in 1908 compelling him to withdraw from the sphere of his former activities. Prior to this he had been a keen student of political affairs and was usually to be found in the advance guard of progressive legislation, participating as well in numerous municipal and other contests. He was a staunch Liberal throughout his life. He suceeded his brother as reeve of Trafalgar Township, and continued for forty years councillor and reeve, besides being County Warden. Since his retirement he followed with unabated interest the developments in temperance legislation, of which he had been a keen supporter, and it is said the greatest joy of his last years was the enforcement of the Ontario Temperance Act. A keen politician, a staunch friend, Dr. Buck was a man of remarkable attainments and experience. He was a graduate of the Royal College of Physicians and Surgeons, London.

DR. RICHARD CARNEY

Dr. Richard Carney died on April 26th at his residence in Windsor. He was born at Barrie, Simcoe County, Ontario, seventy-seven years ago, a son of the late Sheriff Carney of Algoma. After graduating at Toronto University in 1869, he settled in Windsor. As a member of the Liberal-Conservative party of the border county, Dr. Carney received many government appointments for his services: he was collector of customs and postmaster at Windsor. He was the last of Windsor's famous triumvirate—Drs. Casgrain, Coventry, and Carney—who controlled the policies of the Conservative party in Essex County for twenty-five years. Through the efforts of Dr. Carney the maternity wing of Hotel Dieu was opened, one of the wards being named after one of his daughters. He was an active member of the Board of Health, of which he was chairman for several terms. He was also consulting physician for the Grand Trunk railroad. Previous to his decease Dr. Carney had been ill several months from paralysis.

DR. LOUIS EDOUARD DESJARDINS
1837–1919

On March 2nd, Laval University of Montreal had the misfortune to lose their oldest professor, and the medical profession one of its most distinguished members.

Louis Edouard Desjardins was born at Terrebonne, on September 10th, 1837. He studied medicine at Victoria University, receiving his medical degree in 1864. He practised general medicine for seven years, and then he made his first voyage to Europe, where he devoted his time to cphthalmology. In London, he followed the clinics of Bowman and Critchett, and in Paris those of de Wecker, Galzowski, Sichel and Meyer. Returning to Montreal in 1873, he established the "Institut Ophthalmique de l'Asile Nazareth," and practised there as oculist for more than thirty years. He was one of the founders of the journal *L'Union Medicale*," and some years later, of the *Gazette Medicale*.

In 1882, Dr. Desjardins was appointed professor of ophthalmology in the "Ecole de Médecine et de Chirurgie de Montréal," and oculist to the Hotel-Dieu, where he gave his lectures till his last illness. At the time of the affiliation of the "Ecole de Médecine et de Chirurgie de Montréal," with Laval Undiverity, under the name "Faculté de Médecine de l'Université Laval," he retained the chair of professor of ophthalmology.

Dr. Desjardins, who has published a number of papers on cataract, glaucoma, affections of the eyelids and refraction, interested himself especially in ocular researches on the deaf and dumb.

Endowed with those most beautiful qualities, charity, modesty, and urbanity, Dr. Desjardin's death is a loss which will be felt by the whole medical profession, by his numerous patients and by those friends in France whom from time to time it was his happiness to meet.

Dr. A. D. Macdonald, formerly of New Brunswick, died in Montana on April 5th. He was superintendent of the state tuberculosis sanitarium at Galen, in Deer Lodge county. He graduated at McGill University and practised medicine in St. John West, until forced by ill-health to seek a different climate.

The death of Dr. S. A. Verge, at the age of sixty-five years, occurred unexpectedly at Quebec recently. Dr. Verge had practised in that city for thirty-seven years.

Miscellany

News

THE WESTERN PROVINCES

THE recent survey into the condition of the insane and feeble-minded in Manitoba has been reported on by Professors Hincks and Clarke, and the report was handed to the attorney-general who submitted it to the consideration of the government. Increased accommodation at the Brandon Asylum is necessary, and a proposal is on foot to meet the difficulty by the expenditure of a sum estimated at something approaching half a million dollars. Many of the patients who are, or have been under treatment, are not permanent defectives, and it is realized that the province is not adequately equipped for the handling of such cases and provision must be made for their temporary treatment. Dr. A. T. Mathers has been in the east for some time inquiring into the best methods of psychopathic work. In deciding upon the enlargement of the Brandon institution, either cottage homes or a special dormitory arrangement will be provided for the exclusive accommodation of those patients requiring only temporary treatment.

THE Winnipeg General Hospital Board is planning a yearly clinic week to which physicians from the entire West will be invited, and which will serve as an exchange of experience and ideas. With it is the proposed formation of an Internes Alumnæ Society to bring former members of the house staff together.

A psychopathic ward where alleged insane persons will be kept under observation and treatment will be opened under the supervision of the General Hospital and Dr. A. T. Mathers, supervisor of the psychopathic department at the Johns Hopkins Hospital, Baltimore, will be in charge.

Dr. Alexander Gibson, M.A., M.B., C.H.B., F.R.C.S., will be one of the principal speakers at the Saskatchewan Educational Association to be held in Regina shortly. Dr. Gibson is a specialist in the surgery of deformities and bone and joint diseases, and his work in the field of nerve surgery has attracted wide attention. The subject of his address will be, "The Posture of School Children."

THE Province of Alberta is providing a special course in obstetrics for nurses who will agree to work in outlying districts. For this purpose $30,000 has been voted in the health estimates. A class of ten new public nurses has been started at Edmonton, taking a special course provided by the Provincial Government at the University, for medical inspection of school children and baby welfare work. Four nurses have already graduated, and have been assigned to different centres. This is the inception of the health work under the new department created at this session with Hon. A. G. Mackay, Minister of Health, in charge. Alterations in the new Municipal Hospitals' Act, whereby members of the hospital boards from areas within the boundaries of municipalities are elected by the people instead of being appointed by the contributing councils were brought before the legislature during the recent session by Hon. A. G. MacKay. This important change was brought about through strong opposition to the appointment system, when the bill was under discussion the week previously. Other changes in the Act were introduced, one providing that municipalities may borrow funds to supply nurses where needed. Mr. Mackay strongly urged the establishment of training schools for superintendents or matrons. Arrangement is made in the bill for arrangement with some of the larger hospitals for such training schools. The question of establishing sub-hospitals was reconsidered. A limit was made that no sub-hospital should be established within thirteen miles of a main hospital, and then only with the consent of the minister. Consideration will be made, however, for emergency hospitals in mining districts.

An important series of lectures during the months of February and March, under the auspices of the Alberta Public Health Inspectors' Association were recently given in Calgary. Well-known health officials and other medical men of standing participated. The programme was varied and interesting. "The City Laboratory and its Relation to Public Health Work," "Plumbing, Past and Present," "Water Supply and Sewage Disposal," "Modern Sanitation," "Bacteriology," "Inoculation and Immunity from Disease," and others. A fall session will be continued in October. The lectures were specially intended for those who intend to qualify for public health work in its various branches.

THE Provincial Government of Saskatchewan has selected Weyburn as the site for the proposed mental hospital, and has appointed Dr. R. M. Mitchell, speaker of the legislative assembly,

as superintendent. Dr. Mitchell has resigned the speakership and his seat in order to assume his new duties. The cost of the mental hospital is estimated at $1,000,000, of which $250,000 was appropriated by the last session of the legislature. The hospital will have a capacity of 1,600 beds when completed.

THE Social Service Council of Saskatchewan held its annual convention some time ago. It was widely attended, the secretaries of the Council having sent out a circular letter inviting the attendance and co-operation of the public. Special addresses were given by those who could speak with authority on the subjects under discussion. Dr. Clarence M. Hincks, secretary of the National Committee on Mental Hygiene, showed how mental defectiveness and venereal diseases are eating into the national life, and urged practical methods of combatting these. Judge Ethel MacLachlan spoke most effectively out of her experience as judge of the juvenile court. Dr. J. G. Shearer, secretary of the Dominion Social Service Council, spoke on the social ideals and programme of the new day. Prominent ministers and laymen gave forcible addresses and joined in the general discussions.

A CONFERENCE has been arranged for May 15th, to enlist the sympathy and support of rural municipalities, towns and villages served by the Saskatoon Hospital. The important matter of providing adequate accommodations to meet the growing demands of the district will be the object of the meeting. This will be their first endeavour to bring about unity of action on a subject of vital interest to the entire community. Invitations have been addressed to the reeves, mayors and overseers of the public bodies which number seventeen rural municipalities, seven towns and seventeen village councils.

THE second annual convention of the Saskatchewan Registered Nurses' Association was held on April 24th, at Moose Jaw. The Association, after considerable effort, had their registration passed by the Legislative Assembly in March, 1917. Since then, four hundred nurses of accredited training schools have become members and the training schools of the province must now employ registered nurses as members of their graduate staff. The Association is fully aware of the great need of something to meet the demand of nurses in the province, and a considerable time was given to the question of rural nursing during the conference.

THE British Columbia Hospital Association will hold its next convention at Victoria on July 8th, 9th and 10th, the week following the National Nurses' Association convention, which will be held in Vancouver and will therefore give an opportunity to the nurses from all parts of Canada to attend the convention in Victoria.

A CRUSADE against the insanitary conditions of Chinatown was recently inaugurated by the health department of the city of Vancouver. Under the Provincial Medical Health Act, six inspectors took drastic measure to enforce obedience to the law. The district had become a menace to the health of the entire city. The death rate from tuberculosis had become appalling. Thirty-six per cent. of the deaths in Chinatown were from this disease, and the death rate in the district was double that of the remainder of the city. During 1917 the death rate per thousand Chinese was 18, showing an increase last year of 4·2 per thousand; one in every 2·8 deaths was from the dread white plague. That the insanitary conditions of the district must be stamped out is the determination of the health department. "The people of Vancouver do not grasp the gravity of this menace," was the statement of Inspector Hynes, who added that pamphlets had been printed in Chinese to circulate in the locality, telling the denizens that the by-laws would be rigidly enforced.

A DEPUTATION of Vancouver medical men outlined an elaborate scheme of hospital extension before the Burnaby council lately. The proposition calls for a state hospital, more especially for infectious diseases, operated under government control, and fitted with the necessary up to date scientific appliances together with a staff of specialists and trained nurses. This hospital to be utilized free of cost to individual patients, but its operation and maintenance is to be paid for by the government with assessments or taxation on those districts which would come under the workings of the hospital, or chain of hospitals.

HON. J. D. MACLEAN dealt with the medical features of the government's administration in debate on the budget. The work of the insane hospitals at New Westminster and Essendale, where 1,500 patients are cared for, was outlined. The cost per capita of maintaining the patients was eighty-one cents per day. He pointed to the necessity of making adequate provision for the care of the mentally defective children, of whom some 500 to 1,500 are

believed to be in schools, and stated that through an arrangement made with Dr. Clarke of the National Commission of Hygiene, an expert would go to British Columbia in April and make a survey of the children in the schools, and upon that survey will be based the system of cottage institutions it is proposed to inaugurate at the mental hospital at Essendale, where adequate steps will be taken to assist the mental development of such defectives.

The steps taken to improve health conditions in the eight hundred or more camps scattered throughout the province, and the excellent results following the establishment of police supervision and inspection were described by the Minister, who stated that the department had not as yet been able to secure a competent man for the position of travelling medical officer created last year, but valuable work has been done through the issuance of pamphlets to the number of 150,000, of which 80,000 dealt with the prevention of the spread of tuberculosis. He outlined the arrangements made with the Dominion whereby the province will contribute $75,000 towards the construction of a hospital at Tranquille with accommodation for one hundred and forty beds. While that building will be devoted for a few years to returned soldier patients, ultimately it would be turned over to the province and afford much needed accommodation. The institution at Tranquille has done magnificent work. There was one point in the speech of the member for Similkameen that came out when the subject came up for debate in the House that will doubtless commend itself for action by the government. His proposal was a system of certificate or permit so that the whereabouts of all tuberculous patients should be verified and any charges properly debited on the province of origin.

ARMY MEDICAL SERVICES

THE Distinguished Service Order has been awarded to Major Burnet Kelly, C.A.M.C., and to Major John Blair (Dental), C. A.M.C.

THE Military Cross has been awarded to Captain John P. Bonfield, C.A.M.C., and Captain Walter C. Morgan, C.A.M.C.

THE following received the Military Cross at a recent investiture at Buckingham Palace:—Lieutenant-Colonel Robert Gardiner, Major Henry Barrett, Major Alva Chapman, Major Arthur Jones, Captain Lambert Densmore, all of the Canadian Army Medical Corps.

THE Royal Red Cross has been awarded to the following Canadian nurses for valuable services rendered:—First Class—Jean Cameron-Smith, Matron, No. 13 General Hospital, Hastings; Martha McBride, Assistant Matron, 5th General Hospital, Kirkdale; Nursing Sister Christiana Mary Mowbray; Nursing Sister Isabella Wilson. Second Class—Martha Jane Stewart, Assistant Matron, 12th General Hospital, Bramshott; Nursing Sister Jane Glendinning; Nursing Sister Edith Louise Hibbs; Nursing Sister H. Irene Robertson.

THE following have been brought to the notice of the secretary for war for brilliant services:—H. Stevenson, H. Sweeney, M. Wallace, C. H. Witham, Medicals.

The tablet to the memory of the nine medical students of McGill University, who gave up their lives in the great war, was unveiled recently in the New Medical Building by the undergraduates of the Medical Faculty, whose president made the formal presentation to the university. Addresses were given by Dean Moyse, vice-principal of McGill, who presided, and Lieutenant-Colonel Patch, A.D.M.S., who came to pay tribute on behalf of the medical services of the army of the district. Dr. G. E. Armstrong, acting dean of the faculty of medicine, delivered the address as the tablet was unveiled. He then read the list of the fallen and their medical records. Major the Rev. Canon Shatford pronounced the dedicatory prayer. Lieutenant-Colonels Russel, Meakins, Turner and Hill, all of the military medical staff, were present.

Appointments:—Major Julian Southworth Boyd is appointed under the A.D.M.S., Embarkation.

Captain Harry Clyde Robertson is appointed under the A.D.M.S., Embarkation.

Captain Frederick Grant Banting, M.C., is posted for duty under the A.D.M.S., military district No. 2.

Colonel Samuel Hanford McKee, C.M.G., is posted for duty under the A.D.M.S., military district No. 4.

Lieutenant-Colonel William Wylie Nasmyth, is appointed under the A.D.M.S., Embarkation.

Captain Donald Alexander Warren, M.C., is posted for duty under the A.D.M.S., military district No. 2.

Captain (Acting Major) John Johnston is posted for duty under D.A.D.M.S., Sanitation, military district No. 1.

Captain Lawrence Roy Shier is posted for duty under the A.D.M.S., military district No. 10.

Lieutenant-Colonel David King Smith is posted for duty under the A.D.M.S., military district No. 2, on ceasing to be employed as Officer Commanding Davisville Military Hospital.

Major Alan Beech is posted for duty under the A.D.M.S., military district No. 11.

Captain John James Danby, from military district No. 3, is posted for duty in the Directorate of the D.G.M.S., Ottawa, vice Major Garnet Greer.

Major Louis Wellington MacNutt is posted for duty as Officer Commanding Charlottetown Military Hospital, vice Lieutenant-Colonel George Warburton.

Major George Garnet Greer, M.C., is posted for duty under the A.D.M.S., military district No. 3.

Acting-Major Thomas Albert Watterson, from military district No. 6, is appointed Officer Commanding, Fleming Military Convalescent Hospital, Ottawa, vice Major W. H. Ballantyne.

Captain James Giles Robinson Stone, from military district No. 2, is posted for duty on the Directorate of the D.G.M.S., Militia Headquarters, Ottawa.

Captain James Frederick Stewart Marshall, M.C., is posted for duty under the A.D.M.S., military district No. 13, and to be appointed Officer Commanding Ogden Military Convalescent Hospita, with effect from 6th May, 1919, vice Captain A. A. Drinnan.

Captain George Douglas Jeffs, is posted for duty under the A.D.M.S., military district No. 2.

Major Colin Andrew McDiarmid is posted for duty under the A.D.M.S., military district No. 4.

Major John Alfred Briggs, is posted for duty under the A.D.M.S., military district No. 4.

Promotions:—Lieutenant Philippe Auguste Charette, to be Captain.

Lieutenant Harry Herbert Bruser, to be Captain.

Lieutenant Elphage Lelande to be Captain.

Lieutenant Didace Romeo Bisson, to be Captain.

Captain Alexander Gibson to be acting-major.

Returned from Overseas.—The undermentioned officers are

returned from overseas on general demobilization, for further duty, etc.:

Major F. W. Kenny, Major P. Poisson, Lieutenant-Colonel Selby, Major W. G. Cosbie, Captain R. T. Washburn, Captain J. Gibbs, Major J. T. Wall, Captain Frank Harvey, Lieutenant-Colonel C. A. Young, Acting-Lieutenant-Colonel D. S. Lomer, D.S.O., Major W. D. Kennedy, Captain H. N. Harvie, Captain A. G. Thompson, Colonel R. P. Wright, Major G. Bouthillier, Captain J. G. R. Stone, Major R. Mayrand, Captain E. B. Moles, Major R. B. Robertson, Captain D. E. S. Wishart, Major C. E. Saint-Pierre, Lieutenant G. E. W. Crowe, Major J. F. Burgess, Captain H. A. Simms, Captain Millen Alexander Nickle, Lieutenant-Colonel Z. Rheaume, Captain J. L. Hammond, Major Sir Andrew MacPhail, Major W. H. Laughlin, Captain R. Goulden, Captain W. E. Case, Major A. J. Swan, Major F. S. Ruttan, Captain Lambert Douglas Densmore, Major Leo Errold Parisien, Captain James Lewin, Major Ralph Marshall Filson, Captain Emmett Scarlett.

Book Reviews

ADVANCED SUGGESTION (Neuro-induction). By HADYN BROWN, L.R.C.P., Fellow of the Royal Society of Medicine. 342 pages. Price, 7/6 net. Publishers: Baillière, Tindall & Cox, 8 Henrietta Street, London, 1918.

We think the title of this fascinating book should have been non-hypnotic psycho-therapy. It is at once an interesting book and a puzzling book. It is interesting because all the remarkable things in it are vouched for by a medical man who is L.R.C.P., et cetera, Edinburgh (what are we to understand by the "et cetera?") and it is puzzling because there is a tendency to use old terms in new senses and to invent new terms when old ones would do. The work is a record of cures effected by the author, not by hypnosis but by "suggestion" or, as Mr. Haydn Brown prefers to call it, "neuro-induction". This curious term is best explained in the author's own words, "Neuro-induction implies the accurate conveyance of reliable sensations and conclusions and their correct interpretation," etc. Now what is meant by the conveying of sensations reliable or otherwise? As an ultimate fact in some one person's experience, a sensation cannot be conveyed anywhere.

Neither can you convey conclusions, conclusions from what? The physician's arguments, apparently.

Another puzzling term is "supra conscious"; we are told in the footnote on page 22 that "all above the subconscious is supra conscious". If so, where and what is ordinary consciousness, the low, old, familiar consciousness unadorned, as it were, by a prefix?

All this is not to be taken to mean that the book is not worthy of study, for it is, every word of it. Amongst other things of great importance is the author's belief in the reality of nerve energy.

Unless nerve-energy is real there is no meaning in writing "leakage of nerve energy"; "weakened nerve influence"; "an idea has caused disturbance in bodily functioning", and so on in the same strain. The recognition of functional psychic inertia in the phrase "inertia of subconsciousness" is very interesting. The author says that Professor Adami may be quite happy with the conclusions of the work; the reviewer can assure him that there is one thing in the book which will not please Dr. Adami, and that is the belief in the reality of maternal impressions.

D. Fraser Harris.

EQUILIBRIUM AND VERTIGO. By ISAAC H. JONES, M.A., M.D., laryngologist, Philadelphia General Hospital; with an analysis of pathologic cases by LEWIS FISHER, M.D., laryngologist and otologist, Mount Sinai Hospital, Philadelphia. 444 pages with 130 illustrations. Price, $5.00. Publishers: J. B. Lippincott Company, Philadelphia, London and Montreal, 1918.

The degree of specialization in practical physiology is well shown by the need of the publication of such a book as this; for the need is very real. The understanding of the functional position of the labyrinth is one of the most recent attainments of the physiologically minded clinician. But the subject is one eminently for the specialist and needs a monograph by a specialist; such is the book before us.

The summaries of the results of the tests are given with commendable brevity. The illustrations and diagrams have been very well selected; some are for use with the stereoscope. If a criticism might be allowed as to the diagrams it is that the various nerve tracts should have been shown as neuroses, that is as processes of cells proceeding inwards or outwards in the nervous system. If the "trophic" cell is omitted, we cannot tell at a glance the functional direction of the path in question.

INFORMATION FOR THE TUBERCULOUS. By F. W. WITTICH, A.M., M.D., instructor in medicine and physician in charge of tuberculosis dispensary in the University of Minnesota Medical School. 150 pages. Price, $1.00. Publishers: C. V. Mosby Co., St. Louis; McAinsh & Co., Toronto, 1918.

This small book contains everything of interest or importance to persons affected with tuberculosis. It explains from the very beginning the physiology of breathing and its pathological modifications. Anyone reading this book will learn much besides facts about tuberculosis, for whatever is dealt with is discussed so pleasantly and clearly that the sense of technicality is lost. The elementary physiology is well put.

The remarks on alcohol bear the evidence of common sense. In the phrase, "a pessimist cannot recover", is bound up a world of meaning as to the power of the mind over the body—a real thing in spite of some philosophers.

Is not "biliousness" rather too vague now-a-days? There is no English verb "to culture" (page 21).

ANATOMY OF THE HUMAN BODY. By HENRY GRAY, F.R.S., fellow of the Royal College of Surgeons. Twentieth edition, thoroughly revised and re-edited by WARREN H. LEWIS, B.S., M.D., professor of physiological anatomy, Johns Hopkins University, Baltimore. 1246 pages; illustrated with 1,247 engravings. Price, $7.50 cloth, $9.00 leather. Publishers: Lea & Febiger, Philadelphia and New York.

To praise Gray's anatomy savours somewhat of painting the lily and throwing a perfume on the violet. It is difficult to imagine how a systematic and comprehensive text-book of anatomy could be made more systematic or comprehensive than this.

Nothing is forgotten; the naked eye appearances, development, histology, innervation, variations from the type and even much of the normal physiology of the organs are all concisely given. A special section is devoted to surface anatomy. By the use of coloured inks, the value of many diagrams is greatly enhanced.

Medical Societies

CANADIAN MEDICAL ASSOCIATION:—President—Dr. H. B. Small, Ottawa President-elect—Dr. S. G. Grondin, Quebec. Acting Secretary-treasurer—Dr. J W. Scane, 836 University Street, Montreal.

ACADEMY OF MEDICINE, TORONTO:—President—Dr. D. J. Gibb Wishart. Secretary—Dr. J. H. Elliot, 11 Spadina Road. Treasurer—Dr. J. H. McConnell.

ALBERTA MEDICAL ASSOCIATION:—President—Dr. G. A. Anderson, Calgary Secretary-treasurer—Dr. A. Fisher, Calgary.
Annual Meeting, Calgary, 1919.

ASSOCIATION OF MEDICAL OFFICERS OF THE MILITIA:—President—Lt.-Colonel A. T. Shillington, A.M.C., Ottawa. Secretary—Captain T. H. Leggett A.M.C., Ottawa.

ASSOCIATION OF MEDICAL OFFICERS OF NOVA SCOTIA—President—Dr. George E. DeWitt, Wolfville. Secretary—Dr. W. H. Hattie, Halifax.

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